SEP 22 1922

THE GEOGRAPHICAL JOURNAL

Vol. LX No. 3 September 1922

Abyssinia and Abyssinians of To-Day . . . . . C. F. Rey 177
Through Western Yunnan . . . . . F. Kingdon Ward 195
The Wireless Receiving Equipment of the Hamilton Rice Expedition, 1919–20
John W. Swanson (communicated by Dr. Hamilton Rice) 205
The Pibor River . . . . . Major D. Hay Thorburn 210
The Mount Everest Expedition 218
The Rocks of Mount Everest . . . . . Dr. A. M. Heron 219
Reviews The Monthly Record Obituary Correspondence Meetings of the Society
Contents v
Society Notices vi

LONDON
THE ROYAL GEOGRAPHICAL SOCIETY
KENSINGTON GORE S.W. 7
EDWARD STANFORD, LTD. 12 LONG ACRE W.C. 2

Price Two Shillings

ILLUSTRATED BIBLIOGRAPHY OF SCIENCE.

BIBLIOTHECA CHEMICO-MATHEMATICA:

CATALOGUE of Works in many Tongues on EXACT AND APPLIED SCIENCE,
WITH A COPIOUS SUBJECT-INDEX. Compiled and annotated by
H. Z. and H. C. S.

With 127 Plates, containing 247 Portraits and Facsimiles.
2 vols. large 8vo, *comprising* xii + 964 *pages* (*including 96 pp. of Index*), *bound in red linen-buckram, carmine top edges.*

Price £3 3s. nett.

Descriptive Prospectus and List of Press Reviews on application.

"The importance of the work to the lover and collector of books on the exact sciences need scarcely be emphasised; the interest which it holds for the historian and the plain man is astonishing. This interest is largely due to the notes, which, combining considerable scholarship with a dry humour, all the more welcome for its austere setting, place the volumes among those which can always be taken down from the shelves to fill in an odd half-hour with not unprofitable browsing. . . . A most valuable and comprehensive catalogue, a work which is a further illustration of that great merit of England, the power to produce by private enterprise undertakings which, in other countries, would be entrusted to committees and societies, to come forth ultimately without the personal touches which give this performance a pleasant intimacy."—*London Mercury.*

HENRY SOTHERAN & CO., 140, Strand, W.C.2, and 43, Piccadilly, W.1.

ADMIRALTY CHARTS

THE LATEST EDITIONS OF CHARTS, PLANS, & SAILING DIRECTIONS, PUBLISHED BY THE ADMIRALTY, CAN BE HAD FROM

J. D. POTTER,

Admiralty Agent for Charts,
& Publisher of Nautical Books,

145, MINORIES, LONDON, E.1

Official Catalogue of Admiralty Charts, Plans, and Sailing Directions, a vol. of 880 pp., with 45 Index Charts (gratis).

On the Correction and Use of Charts, Light Lists, and Sailing Directions, a vol. of 40 pp., royal 8vo; bound red cloth (gratis).

Cameras

at HALF LIST PRICE

DO you know that you can buy any Kodak or other make of Camera Second-Hand at about HALF the new price.

Sands Hunter's have all makes in stock, SECOND-HAND, at money-saving prices.

CALL or write for Catalogue—before buying, exchanging or selling any Camera.

Thousands of Cameras by all well-known makers always on View.

Hundreds of Second-hand Kodaks.

Sands Hunters

Photographic Stores (ESTABLISHED 1874).
37 Bedford Street, Strand, London.

However 'light' you travel—

make room for BOVRIL

—you're sure to need it.

The Geographical Journal

Vol. LX No. 3 September 1922

ABYSSINIA AND ABYSSINIANS OF TO-DAY

C. F. Rey

Read at the Meeting of the Society, 12 June 1922.

I PROPOSE to sketch the development which the Abyssinians have reached to-day, as evidenced by their characteristics, customs, and institutions; to afford some explanation of the reasons for their somewhat curious conditions; and to indicate the possibilities which the future holds.

The people of the country (for reasons into which it is unnecessary to enter here) do not describe themselves as Abyssinians, but as "Ethiopians," and their country as "Ethiopia"—a description which is geographically and historically confusing, and which I shall not adopt in the present paper. And the Abyssinians properly so called (who alone form the subject of my remarks to-night) number to-day probably considerably less than one-third of the population included within the limits of their Empire.

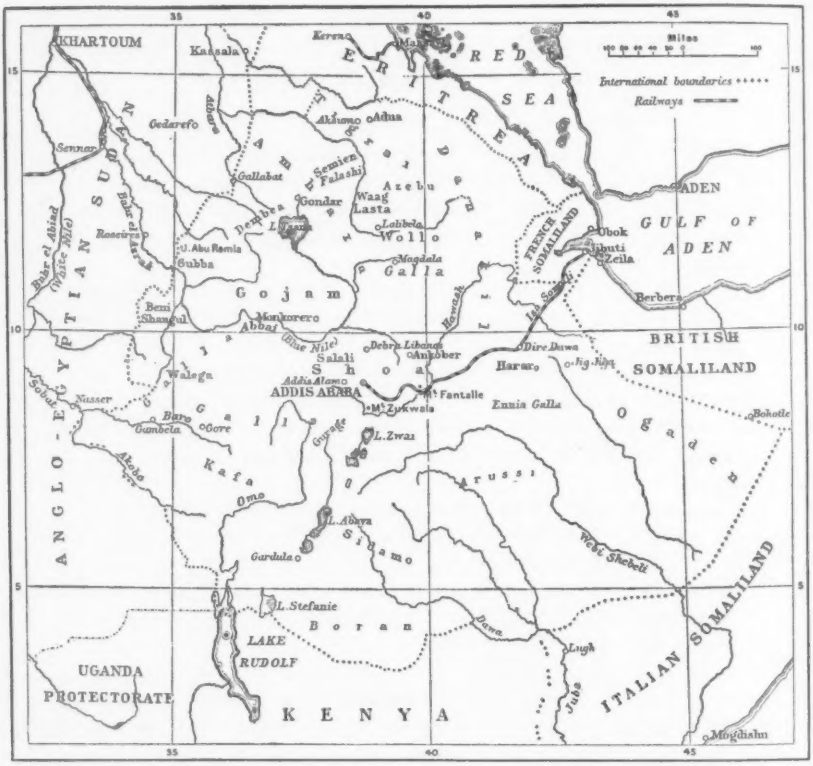
The figures are very conjectural, but recent estimates compiled with some attempt at accuracy indicate a total population of about 11½ millions, of which rather less than 3½ millions are Abyssinian. Broadly speaking, these are the inhabitants of the provinces—lately kingdoms—of Tigrai, Amhara, Gojam, and Shoa (in part), which cover an area of rather over one-third of the whole country.

The bulk of the remainder of the population is Galla, estimated to number nearly 6 millions, and distributed mainly in the south and west, although certain branches (Azebu, Yedjow, and Wollo Gallas) are found northwards between Abyssinia proper and the Dankali country. This is an important factor in considering the Abyssinian conditions obtaining to-day. The rest of the population may be roughly divided among the Danakils in the north-east, Somals east and south-east, and various Negroid races referred to loosely as Shangalla on the north-west.*

It is by no means easy to form a balanced judgment on affairs Abyssinian—everything is so different from other parts of Africa. And especially is this difficult to one arriving from, say, a British colony,

* I am personally of opinion that these population figures are exaggerated, but they cannot be checked at present.

where the white man is supreme, the country is his, and all direction is in his hands. In Abyssinia the country belongs to the brown man, the power is his, the white man (or the red man, as they call him) is an immigrant and a not too welcome one. He is not regarded with that respect which obtains in a country he has conquered, for he has been defeated in the open field and that comparatively recently, though armed with all the weapons of civilization.



Sketch-map of Abyssinia to illustrate Mr. Rey's paper.

Consequently, a mental gymnastic is necessary if a just appreciation of the people is to be formed, and even if this be accomplished it is by no means easy to glimpse their mentality, and to appreciate—still less to describe—the medley of conditions that go to make the whole. For the ancient, the mediæval, and the modern jostle each other to-day in almost every phase of life, and the customs and habits of the past do not seem to be superseded by, but exist side by side with those of the present.

Their institutions form a good example of this. The form of government is an absolute monarchy, based on a feudal system of the most ancient kind. Both have been tempered by modifications. Efforts have been made to whittle down the absolutism of the monarchy's power, but so far without much success. The establishment of a so-called Council of Ministers does not appear to have been attended with any very real consequences, and although there are Ministers of War, of Finance, etc., and an Afa Negus or Lord Chief Justice, most of the power still lies in the hands of the sovereign.

This power has, however, been reduced in another way. When the great chiefs of the country rose against the late Emperor, Lej Yasu, they nominated as his successors in 1916 Zauditu, Menelik's daughter, as Empress, and Ras Tafari, son of that very able man Ras Makonnen, as Regent and Heir-Apparent. The effect of this double-barrelled royalty is certainly to hamper freedom of action and rapidity of decision, and to that extent is a drag on absolutism. But it has other less fortunate results. Apart from the Empress power lies in the hands of Ras Tafari, and indeed it is probably no exaggeration to say that the future of the country rests to a great extent with him.

Ras Makonnen had visited London, Paris, and Rome, and was marked out as the successor of his uncle, the Emperor Menelik, had he not died prematurely. The modern history of the country would have been very different had Ras Makonnen succeeded. His son is undoubtedly also an able man, and although he has unfortunately never been able to visit Europe, he is familiar with its circumstances and history, and is well versed in the constitutional systems of its principal states. He is a fluent French scholar, an indefatigable worker (his hours are usually from about 7 a.m. to 10 p.m.), a reader of catholic tastes (I found him studying a work on Bolshevism one day), and is animated by quite progressive ideas.

But just as Menelik did, so does he endeavour to cope personally with every detail of administration, great and small, important and unimportant; and the disadvantages of such a centralized form of state management are too obvious to need recapitulation.

Unfortunately his progressive ideas are not universal, and one of the most important personages in the country, the Fitorari Hapta Giorgis, Minister of War and one of Menelik's old generals, regards modern ideas and innovations much as the devil is considered to regard holy water, and considers that aeroplanes and epidemics are evils of just about the same degree.

Other persons of importance fortunately do not share his views: such for example are Ras Kassa, the governor of the province of Salali—the country of rolling downs and the great horse-breeding centre—and Ras Hailu, the ruler of Gojam, the last hereditary chief of a province. Both these men are enlightened and progressive, and their government is comparatively good.

The strength of the feudal system was attacked by Menelik, as by Louis XI. of France, though by different methods. He gradually suppressed the hereditary rulers of the various provinces as opportunity offered, and substituted for them nominated governors, a practice which has been followed by his successors to-day, to the evident strengthening of the central authority. Yet the system remains in full force, and many interesting examples of it can be witnessed by any traveller in Abyssinia to-day.

For example, an important source of national wealth is the grass of the country, and the commencement of the cutting is the occasion of a great festival. The Ras in person and his chiefs go out into his grasslands accompanied by all their tenants, soldiers, servants, and followers; the Ras personally cuts a little, his example is followed by the chiefs, and then his dependants get to work, and the fields are rapidly stripped of their produce by the small hand-sickles of the multitude.

On another occasion I learned that the Empress had expressed a desire to proceed to a church some 3 or 4 miles from Addis, but a few days beforehand it was discovered that the road was quite impassable. Again the subjects were requisitioned by their liege lords; the Ras and every noble and chief then in Addis each personally moved a few stones on the road, their example being followed by the lesser chiefs, and so on downwards, until nearly ten thousand men were working on the road, which for miles was black with the toilers, the scenery being enhanced by the bright-coloured robes, parasols, and trappings of the mules of the great men who were superintending the operations from the shade of the roadside.

I came across a further striking example of the system, and one which well illustrates its more unfortunate aspects. The governor of a large and fertile district in the south-east was discussing with me the question of introducing modern agricultural machinery on his estate. I had explained the advantages of motor-ploughs, and had given him figures of the cost of ploughing per acre with these machines and the rapidity with which the work could be done. His reply was, "Yes, that may be cheap in your country, but it is very dear in mine. For what does it cost me to plough? Every man in my district is obliged to come with a yoke or more of oxen and do a given amount of ploughing on my lands. I kill a few oxen to feed them, which means little to me, and I have no other expenses. Why should I spend all this money on getting my land ploughed a little more quickly?" That may be good for the governor, but it does not help progress. This last example shows a vicious state of affairs, which is one of the several factors accounting for the non-development of the country.

The governors nominated by the central authority receive no salary; they have to rely on taxation of their province for their income—10 per cent. of the production; they maintain small armies of troops, and have

to be prepared in case of war to provide a quota of men for the assistance of the sovereign.

The peasants are on the whole pretty badly treated, as the soldiery, who are ill paid, are apt to supplement their official salaries in ways that would not commend themselves to British farmers. It must of course be borne in mind that this is probably to some extent due to the fact that quite a large extent of the country, more than a half, has comparatively recently been conquered, and that these tracts are for the most part not inhabited by Abyssinians properly so called, but by Gallas, Danakils, Somals, Falashas, Shangalla, and Gurage, etc. In most of these districts the Abyssinians are represented merely by their officials and troops, and in some their sovereignty is none too secure. Even in Menelik's latter days the Isa Somal were very far from being either peaceable or contented, and parts of the Dankali country to-day are not considered at all safe.

The judicial administration has not changed to any great extent, though some practices which prevailed ten or fifteen years ago appear to have become obsolete, or at all events rare, such for example as the "smelling out" of a criminal by a small boy who had been previously drugged for the performance.

There is an elaborate code of laws written in ancient Ethiopic or Geez, but as only some of the priests understand this language, knowledge of the legal system is not widespread. Nevertheless litigation on amateur lines is quite popular, and one passes in any shady corner plaintiff and defendants arguing with tremendous energy on the merits of some more or less trivial question before a judge appointed *ad hoc*.

The penal code is however a much more serious matter; it is based on the Mosaic law, and the penalty of an eye for an eye is still rigidly and indeed literally enforced; for manslaughter death is the sentence. It is fairly common to see the bodies of criminals decorating trees in the market-place, and I have seen as many as seven at one time—though this was quite a gala occasion and seven gallows had been erected specially for the event. Amputation of the hand or foot is still inflicted in repeated cases of theft.

Gangs of prisoners chained together are employed on road works in the capital, and it is pitiful to pass these wretches clamouring for money, for they receive no food, and exist on the charity of their relations and friends, or of any passer-by.

The greatest influence to-day, as in their historical past, is their religion. The Christian religion in its Monophysite form is universal among Abyssinians proper, although, as these form only a dominant minority, the bulk of the inhabitants are non-Christian.

The Somals, Danakils, and some of the Gallas are Moslems; the Shangalla and other Gallas are pagan, though some of the latter believe in a deity they call Wakwe and a number of minor spirits or Sarosh; the

Falashas are Jews. Most of the followers of these various beliefs have a good deal in common in their superstitions and sacrifices.

Many Gallas were converted to Christianity by Menelik, but his methods hardly seem to have inspired the converts with any profound and reasoned conviction of the merits of that belief. When he conquered a Galla country the inhabitants had to become Christians lest worse should befall them, and the process was rapid and simple—immersion in the nearest stream, circumcision, and generally the tying of a piece of blue silk cord round their necks.

Yet the Christianity of the Abyssinians is probably the most important factor of their national life, and there is little doubt but that to it they owe the position of national independence they enjoy to-day. They have fought for it for hundreds of years, they have even fought hard against the introduction of other forms of Christianity, *e.g.* the Jesuit attack at the time of the Portuguese influence in the sixteenth and seventeenth centuries.

And yet, in spite of the bitter warfare in which they have been engaged on this account, they are tolerant of their age-long enemies, surprisingly so when one considers the havoc wrought in Abyssinia by Moslem inroads and Galla invasions. Jews, Moslems, and others practise their religion in peace. Even the Falasha Jewish ironworkers, who are doubly regarded with dislike and suspicion as being Jews and as being possessed of supernatural powers, are treated with tolerance, though avoided. And I have seen religious processions of the followers of Islam on their feast days pass through the streets completely free from molestation.

Moslems in Abyssinia do not appear to be strict or fanatical, in pleasing contrast to the pilgrim (a prosperous Aden merchant), who was overheard soliloquising as he gazed from his ship at the sun-baked sterile arid waste round Jeddah. "A sacred land," he murmured in enthusiasm, "a blessed land, where pigs and Christians cannot live."

The Abyssinians do not encourage missionaries of other denominations to proselytize, but they themselves make no efforts to do so. This is possibly due, in part at all events, to the lack of education and ignorance of their priesthood, of whom there are really enormous numbers. The country is dotted with churches, monasteries, and convents, but the former are for the most part small and unpretentious, generally circular in form, and surmounted by a cross on which are sometimes impaled one or more ostrich eggs.

But the Church does not seem to carry much weight. Their religion seems sufficiently strongly implanted to hold its own among the Abyssinians and to sway the national policy. For example, it was Lej Yasu's leanings to Islam, and not his other manifold failings, that caused his downfall in 1916. For he was undoubtedly popular amongst the rank and file of the army and with a certain section of the people, but when

the national institution was in danger, concerted action drove him from power.

Their religious pageantry is remarkable—the most curious survival of rites which seem to have been introduced by the earliest Jewish arrivals. The dance of the priests at the beginning of the feast of Maskal is really a remarkable piece of barbaric pageantry.

But, apart from the Abyssinians proper, there is evidence to show that Islam is making progress amongst the races within the country, both pagans and Christianized Gallas. The Abyssinians do not make efforts to convert their subject races, or encourage foreign missions to do so either; but on the other hand every Moslem immigrant is a missioner. My impressions on this matter have been confirmed by American, Swedish, and French writers; I think it is a real danger to the peace and stability of the Empire.

As to education, literature, art, they are non-existent. It is true that the Emperor Menelik issued an edict of compulsory education, but he forgot, or omitted to provide, such details as schools and teachers. These are represented by a single half-finished building in Addis Ababa and an Egyptian Director of Education, an intelligent and cultured man on whose shoulders the failure of the "system" so-called can certainly not be laid.

Very few people in the country can read, and still fewer can write; even the most important sign their letters by the impression of a seal at the bottom of their letters, except the Empress, whose seal is at the top. But they use the finger-print system quite extensively; for example, when a large caravan of say two hundred mules is going off into the country, each Nagadi who may be responsible for twenty or thirty mule-loads has his list of goods read over to him and then impresses his inky thumb-mark as a receipt at the bottom of the list.

Possibly the multiplicity of languages used in the country has deterred people from endeavouring to obtain anything more than a speaking knowledge of any of them. For according to Dr. Montandon there are no less than seventy languages in Abyssinia, and two hundred if dialects be included. But practically Amharic, Galla, Tigre, Tigraen, and Arabic cover the bulk of the country, and of these Amharic is the official tongue, but by no means an easy language.

There is, however, much tradition and folk-lore to be found in the old Ethiopian manuscripts, few of which unfortunately have been rendered into English. The Kebra Nagast, for example, and the Miracles of the Virgin are full of delightful old legends, and the priests, and even laymen, are always prepared to narrate fabulous tales of saintly miracles and other happenings which they are inclined to regard as history, but which are more interesting from other points of view. These old manuscripts are, however, regarded with very great veneration, particularly those I have mentioned. It is unfortunate that these manuscripts are

kept in the seclusion of the great monasteries such as that of Debra Libanos, and that the printing press has not made them generally available.

Of art I fear there is little to be said. The interior walls of the churches are certainly decorated with rather remarkable paintings, and others are to be found in the country—mainly religious, with a sprinkling of historical and war-like subjects. But painting has, I am afraid, not reached any very high level. Music and dancing, on the other hand, received a distinct fillip while I was in Addis by the establishment of a "Young Ethiopian Dramatic Society."

In attempting to picture Abyssinian characteristics as I found them, I am on delicate and controversial ground. I can only describe the impressions I gathered during a fairly long stay in the country, and as a result of dealings with all sorts and conditions of men. They are not an easy people to get to know, and I think they understand our mentality as little as we generally understand theirs. As a result they are deeply suspicious of the "frangi"—a suspicion based on fear and experience—and much of the apparent hostility they display to Europeans is, in my view, mainly this suspicion.

They do not themselves desire to overrun their boundaries, for they are a race of highlanders, neither liking nor thriving in the lowlands. When their armies penetrated to the Nile to join forces with Major Marchand, the loss of life in the lowland climate forced them to retire; and so far from their constituting a danger to surrounding countries, it would appear that they are confined to their island mountains by the forces of Nature.

But they are intensely jealous and fearful of any encroachment on their independence, and the keynote of their attitude to Europeans is, I think, to be found in this attribute. They are immensely proud of this independence, of their religion, and of the military prowess which has enabled them to maintain these against all attacks from without and within. They are eminently a warlike nation; their country includes huge tracts which they have comparatively recently conquered, and some still hardly pacified. Every man carries a rifle and a bandolier full of cartridges: if he is a big-enough personage it is carried behind him by one of his numerous retinue.

I do not think it can be said that foreign influence goes for very much in Abyssinia to-day; indeed, there are not many foreigners of any position in the country. The legations of the three principal powers of course count for something. They are very strongly represented, and they were given beautiful park-like grounds by Menelik, in which they have erected substantial buildings in gardens that are a delight to the eye. But apart from this official representation there is not very much that counts. Of foreign religious influence there is next to none. Financial influence is non-existent, as there are no foreign loans. Foreign commercial influence

is very limited for reasons already mentioned—the fear of threats to independence, the absence of ports, the paucity of intercourse with neighbours, the simple nature of their wants, and the self-sufficing nature of the country.

Indeed, the very position of Europeans in the country is anomalous and ill defined. In theory I believe they are subject to Abyssinian law (except for the reservations of an old French treaty), though in practice I need hardly say this is not so. But there is great difficulty about foreigners purchasing and owning land, and outside Addis Ababa I doubt if there are any title-deeds for land at all.

Though the Abyssinians are suspicious of Europe, they are courteous and polite to strangers, and as I am aware that this is not the view of all other travellers, I should like to quote two in support of my contention. Mr. Wylde, who spent much time in Abyssinia on several occasions and travelled on foot a great part of the country, wrote in 1900: "There is no harder worker than the Abyssinian peasant, and no more harmless and hospitable person when left alone and properly treated." And again, "I have been well received everywhere when I have travelled without an escort."

And in a somewhat wild and adventurous journey from Zeila to Addis in 1907, Captain Bentley, who was very nearly murdered by Isa Somals, and later by Danakils, had similarly fortunate experience of the Abyssinians. He says of some Abyssinian officers who had been sent to meet the party: "They proved courteous and kindly gentlemen, and indeed throughout the whole of their stay in the country the motorists experienced, both from high and low, the same never-failing goodwill and kindness."

They are addicted to superstitions, encouraged by the priesthood. For example, I knew of at least two important men who had built themselves good stone houses, but lived in native *tukuls* near by because they had been warned—and believed—that an evil spirit had taken possession of the new house, and they would die if they went to live there. Many wear amulets fastened round their necks with a silken cord; they object to starting on journeys on certain days; in some parts of the country the evil eye is still regarded as a real menace.

Their love of pageantry, display, and functions is quite Oriental, and is shown by the splendour of some of their religious functions and court ceremonies, and by the large numbers of men with whom every chief of importance surrounds himself when he goes out. No person of any standing would think of going out without a retinue of dozens or hundreds, according to his rank and station.

The great banquets at which thousands of men are fed are really remarkable. The huge hall filled with 5000 men at a time; the raised platform on which green silk curtains hide the Empress from the gaze of the multitude while she eats; the blaze of coloured velvets and silks of

the robes of the chiefs and courtiers; the accompaniment of shawms and trumpets to which are ushered in the bearers of the huge red raw joints covered at first by pieces of red brocade;—all this combines to make a really striking picture and one not easily forgotten.

The reception of a minister is also made the occasion of great display. When the new Italian Minister was appointed a year or two ago the roads between the Legation and the Gibbi were blocked with the thousands of troops who were sent to fetch him and escort him to his interview. And the assemblage of chiefs and notabilities was a picturesque sight, framed by the curious buildings that make up the Gibbi, of which the entrance is not the least curious feature.

The Abyssinians are great sportsmen, and as every man carries a rifle of sorts with an assortment of cartridges that may or may not fit it, and as there are no effective game laws, the effect on the game of the country is very serious. The buffalo is practically extinct, and the black leopard exceedingly rare to-day; elephants and lion are still found in certain parts of the country, and many varieties of antelope, from the greater kudoo to the tiny dik-dik. That very rare antelope the Abyssinian Nyala is still to be found occasionally in the Arussi country, and while I was there Major de Laessoe and Mr. Adams were fortunate enough to secure three heads in as many weeks—a really remarkable occurrence. The ordinary leopard is plentiful; two were killed in the Legation grounds in Addis while we were there.

The people are exceedingly fond of anything like a sporting event, and the crowd on the great plain at a race meeting organized by the Europeans is distinctly reminiscent of Epsom—if you omit the rifles. The proceedings were honoured by the presence of the Empress and the Ras—the first time, I believe, that the former has attended a public European function.

Abyssinian tastes are as a rule simple, their food consisting largely of bread made of tef, butter, and peppery compounds of beans, etc. The great luxury is raw meat, of which every one is inordinately fond. It may be a nourishing form of diet, tending to the development of warlike qualities, but it has one drawback at all events, that it is the cause of tape-worm: *tænia helminthosis* is constant and general in Abyssinia, and I believe that another form—*tænia nana*—is found only there. One notices venereal disease, leprosy, and small-pox, as is common in the East. The unfortunate lepers lie about all over the town in the sun, sometimes rolled up from head to foot in their "chamma" to get a real heat bath, in the efficiency of which they believe. They congregate for the receipt of charity round the churches, and some even go on house-to-house visits mounted on a pony seeking alms, when the disease has gone too far to allow them to walk.

The people have not as yet acquired any luxurious taste in clothing, the usual raiment being white cotton trousers, shirts (worn outside), and the "chamma," with which we have been familiarized from the sketches

of the earliest travellers. A brown woollen hooded burnous for the rainy season completes their wardrobe. Fortunately they have not adopted European garments excepting occasionally a felt hat or a helmet. Both men and women sometimes carry a grass native-made parasol; some thieves who tried to get into our house one night dropped one in the excitement of the moment when they were detected and fired at.

The Abyssinians also butter their heads, of which unpleasant practice I have been given three explanations. The first is adornment, and the second protection against the sun's rays. In this connection it is interesting to recall that Mr. Mansfield Parkyns, who spent three years in Abyssinia, used no head-covering of any sort at any time other than a coating of butter. The third reason is that butter in the hair hampers the free movement (and consequent irritation) of creatures who live there. There is possibly something in this, as a "head-scratcher" in the form of a blunt wooden or silver pin is a general ornament, as is also an "ear-cleaner," which resembles a small salt-spoon.

Chiefs and their ladies affect a rather more ornate costume for ceremonial occasions; the black silk cape or mantle replaces the woollen burnous, and the full-dress robes of coloured velvets and embroidered with gold are very striking, especially when set off with the lion's-mane head-dress and gold- and silver-studded shields.

In spite of Mr. Wylde's verdict I cannot agree that on the whole the Abyssinian peasantry can be said to be hard-working. Whether on account of the atmosphere of what is for the most part a conquered country, or from having for so long been engaged in warfare as the staple industry, the Abyssinian takes more kindly to carrying a rifle in the retinue of his feudal chief, or in some position in the army, than to hard manual work in the fields. Nevertheless the Nagadi and the peasant class are industrious, and as the country settles down it is to be expected that this tendency will develop. It is very desirable in the interests of the country that it should, for at present, beyond some quite good basket-work, cotton-weaving on a small scale, and a little pottery, practically nothing is manufactured. The soil yields readily its two and even three crops a year, and cattle, sheep, and goats abound; with these the comparatively simple needs of the population seem to be met.

The people meet for exchange of their produce in the market-places of the towns, of which outside Addis Ababa there are no large ones, and in these market-places are found the only real signs of any activity, thousands of persons every morning disposing of their produce and purchasing shoddy European goods, that, apart from cotton goods, form the bulk of the importation.

Their great failing—in common with most Oriental peoples—is cruelty, both to man and beast, of which I have seen many dreadful instances. It is the more curious that they should undoubtedly be very fond of

children and very kind to them; and also that they should on the whole treat their wives so well in spite of the very lax marriage tie—for the frequency and variety of marriage in Abyssinia indicate catholic tastes and a large heart.

Smoking is practically non-existent; it was somewhat drastically discouraged by King John, who was said to have punished that vice by cutting off the lips of the offender. But on the other hand they make up for this privation by a pretty free indulgence in their own home-made hydromel, beer, and spirits.

The Abyssinian chronology is only seven to eight years behind ours; their new year starts on September 11, so then they are seven years, and from January 1 until September 10 eight years, behind European dates. But from the point of view of progress the lag behind must be put at many centuries. Their capital, though giving shelter to from fifty to sixty thousand persons, is without sanitary arrangements or water supply, but is nevertheless a very fascinating town, bowered in trees, traversed by a number of fair roads, intersected by rivers, which are spanned by some European-built bridges. Its main architectural feature is the Church of St. George, and it contains quite a passable hotel, which was built as a speculation by the late Empress Taitu, and furnished, I was told, largely out of presents made by foreign representatives.

In sanitary amenities the capital is eclipsed by the small town of Dire Dawa, the first stop from Jibuti on the railway, where a water supply is available, and the roads are really quite good. Otherwise their towns are of no importance apart from their historical or religious interest, such as belongs to Harrar, Aksum, Lalibala, and Gondar.

It is not so easy to give an explanation of this remarkable state of stagnation, or to determine what causes have operated to keep this country, the last independent empire in Africa, so far behind the world's advance. Are they the mentality of the race and their unwillingness or incapacity to assimilate new ideas, or are other causes operative?

In my view there are a variety of causes, and I would give the first place to the historical. Their story is one of perpetual warfare from the very earliest times almost up to to-day. They have fought against Arabians, Egyptians, Turks, and Dervishes, neighbouring races of all kinds, such as Adels, Danakils, and Gallas, later against ourselves, and finally against the Italians. Where there was a pause in external warfare civil war took its place, and Amhara, Tigrai, Gojam, and Shoa have in turn conquered and been conquered through the years. They have lived surrounded by enemies, and have had no leisure to turn to peaceful development. They have had all their ports and their coastline taken away from them, and so have been cut off from the world and from progress, and their ships, which centuries ago traded up the Red Sea and the Indian Ocean, are now dim memories.

And recent events have not been more helpful. For after the

devastating wars against the Egyptians and the Dervishes and against each other waged during Theodore's and John's reigns, and the campaign against the Italians during the earlier years of Menelik's rule, the country was beginning to find its feet during the latter years of the last-named monarch. Peace seemed to have settled on the land; foreign enterprise, heralded by the railway, was beginning to turn its attention, very tentatively, towards Abyssinia. European innovations were regarded with less aversion, the feudal system was being attacked charily, when Menelik's illness threw back the dawn of progress.

The intrigue during the last few years of his reign was typical of the worst stages of previous misrule, and his death just before the Great War brought no relief. For then the Powers of Europe had neither men nor money to spare for Abyssinia, and as ships and produce were not available the old historic isolation of the country wrapped it once more, to the accompaniment of internal strife and revolution—a state of affairs which continued during Lej Yasu's brief tenure of power.

So inauspiciously dawned the reign of present rulers. For the first two years of their reign the country was still shut off from the world by war. Then the trade slump fell upon and blighted the commercial efforts which were being made. The country is accordingly poorer and less settled than it was fifteen years ago; it is really astonishing that the lapse has not been greater than it has, and for this we must thank the railway, which reached Addis Ababa in 1917, and which, although a disappointment commercially, has at all events provided a link with the outside world.

A third reason is undoubtedly the feudal system, which I have described shortly, and of which I have given some examples. And further, it must be borne in mind that the country is self-supporting, and unless wants are created the people can afford to live without the assistance of the outside world. The country could produce infinitely more than it does at present, far more crops could be grown to the acre, very many more acres could be cultivated, the herds of cattle, sheep, and goats could be multiplied, but as they have enough for their still modest requirements, this increase is not attempted.

And I am sorry to say we must also look at home for yet another cause of lack of development. For foreign international political rivalry has done a great deal to prevent development rather than to forward it. Every foreign Power was so jealous of any advantage obtained by another in the country that much negative labour seems to have been spent in the past in checkmating the efforts of others. I will not enlarge on this aspect; it is a delicate one, but it has had a sinister effect.

And finally, the absence of all routes of transport is of course responsible for a good deal. I do not in any way wish to decry the effects of the railway, which, after passing through many vicissitudes, engineering, financial, and political, during over twenty years, reached Addis Ababa four years ago, for it has undoubtedly served a useful purpose and has

provided practically the only link with the outside world. But its results are, I fear it must be admitted, disappointing even when due allowance be made for the propensities of some of the races through whose territory it passes. Our friends the Danakils are still very troublesome: they find the fish-plates and other steel work useful for spear-heads, and they distinguished themselves when I was there firstly by removing several miles of copper telegraph wire, a fairly ordinary occurrence, and when this was replaced by iron wire they proceeded to pull it down, and being justifiably annoyed at finding their copper supply thus arbitrarily cut off they signified their disgust by cutting the wire into short lengths and leaving it lying by the line.

Nevertheless, the line seems to the lay mind to have been laid rather for a strategical or political end than for a commercial one: it runs for over one-third of its length through unproductive country, and consequently the wayside stations can hardly be described as teeming centres of activity. This no doubt accounts to some extent for the fact that it is run at a heavy and increasing annual loss.

Apart from the railway, ox-wagon transport near the city and mule caravans over difficult tracks form the only means of communication; and indeed on one route human porterage has to be resorted to, resulting in a cost of £15 per ton for taking goods a comparatively short distance. The bridges do not inspire confidence on close inspection, and the Abyssinians themselves evidently share this view, for they have a habit of blocking them up by driving in posts or piling up huge heaps of brushwood during the dry season, so as to force travellers to use the fords, and presumably to prolong the life of the bridge.

And some of the less scrupulous Greek traders do not improve these structures; one of them told me with some pride how he had scored off his competitors in the race for the season's boat on the Sobat river, by breaking down the bridges behind him—a good example to set the Abyssinians of white civilization and trade methods.

These half-dozen causes that I have given are in my view the main contributing reasons for the backwardness of this land, so favoured by Nature. And the natural point to which this brings one is the question of how long this is to last, and what means are possible to improve matters —what in short are the possibilities that the future holds for Abyssinia?

I have just received a copy of a remarkable work on Abyssinia published in the last year or two in Germany, and giving in three volumes written as a result of four years' labour of a scientific, economic, and political mission a penetrating analysis of the country's capacities from many points of view. It is a remarkably thorough work, and the author arrives at even more optimistic conclusions than I have permitted myself. He adds that in view of the loss of her colonies and the restriction of her territory, Germany must look to emigration as a solution of some

of her economic difficulties, and points to Abyssinia as the field for such emigration and as one of the most promising features of Germany's future. From such a source these conclusions as to potential development are instructive.

It is difficult to refer to the possibilities of the country as one sees it to-day without seeming exaggeration, and I do not desire to emulate the efforts of a distinguished American traveller who, on the faith of a nine days' stay in Addis Ababa, which he reached by a rapid dash from the coast, and to which he returned equally rapidly, wrote of having seen gems "scattered over the desert waste washed down from the mountains above," crystals which he was told "suggest diamonds," and "specimens pointing to rubies, opals and emeralds." The extraction of copper, iron, and the ordinary ores was "merely a question of finding facilities for shipment," and "gold was hidden away in the mountains in quantities which can be estimated by no existing data."

I am not prepared to endorse these remarks. But if you have combined a sojourn in the country with some study of its history and an examination of the map it is difficult not to feel optimistic as to its possibilities.

The climatic conditions on the main Abyssinian tableland are delightful. Almost throughout the year one enjoys a temperature akin to that of a temperate English summer's day. The rainfall averages about 1250 mm. in the year at Addis Ababa (2440 metres), about 1000 mm. at Gondar (1904 metres), and about 900 mm. at Harrar (1850 metres).

It is a climate that is eminently suitable to Europeans; indeed the only creatures to which I have known it inimical are European dogs, who rarely survive more than a few months—possibly owing to the altitude. The scenery is very beautiful, and indeed I believe on this point there is complete unanimity. I gather that there are parts of the country which are even more beautiful than those I was able to visit.

It is in fact a garden surrounded by desert, a garden of varying levels and climates where it is possible to grow almost everything that grows anywhere, which affords pasturage to vast herds of cattle estimated at from 10 to 15 million head, and to countless flocks of sheep and goats; probably (though this is not established) rich in minerals, housing a population estimated at as much as 11½ millions, well wooded in many districts, and well watered for a large part and capable of irrigation; irrigating terraces indeed are said to have been made there so long ago as the flourishing period of the Neolithic civilization.

The north-west frontier of Abyssinia lies only 150 miles from the nearest point of the Cape to Cairo railway, and if that artery of communication be more broadly described as a route, Abyssinia is already linked to it by the waters of the Blue Nile.

It is true that, as I have already described, means of communication

are, apart from the Jibuti-Addis Railway, almost entirely lacking, but there is no reason why they should remain so. By extension of the railway from the coast; by linking up the country with the great central railway artery of Africa; by the formation of roads; and the utilization of the water powers of the rivers, there seems little reason why this—the richest undeveloped district of Africa—should not be capable of contributing its quota to the wealth of the world.

But the difficulties in the way are great, as I have already pointed out; it cannot do so alone and unaided, and it is jealous and suspicious—not without reason—of foreign interference.

Nevertheless foreign assistance should, and indeed must, sooner or later be forthcoming in some form or another to help in the solution of the problem, and the form which this assistance should take, the manner in which it should be applied, is a matter which might well occupy usefully those who are responsible for, or interested in, the great question of African progress.

Mr. GERALD CAMPBELL: I must congratulate the author on his interesting paper, and on the wonderful fund of knowledge he has acquired in Abyssinia. I feel a special regard towards him, because I think I was one of the first people he saw out there, and he was one of the last people I saw when I left Addis Ababa, after four and a half very interesting years, during which time Lij Yasu was deposed and the Mussulman-Christian war took place.

The paper deals with the present state of Abyssinia. I have not been there for two and a half years, but the present state is sure to be just like the past, from what I know of it. In reviews of this nature I feel that the chaotic state to which Lij Yasu reduced the country has not had its due. The chiefs of the different provinces had become used, under the reign of Menelik, to governing their provinces fairly well. They received orders from the Central Government in Addis Ababa, which they felt they had to obey. When Menelik died, and this boy Lij Yasu came to the throne, they felt that they ought to make allowances for a youthful ruler; but when they were ordered to the capital and, after travelling several weeks to get there, found the ruler had gone out several miles into the bush—he was one of those internal navigators who like to have a wife in every port—or, after sitting up all night, had gone to sleep during the day, and they were kept outside the palace with their enormous retinues for many hours, they degenerated, and the country became chaotic. He was succeeded by Zauditu, but not in the approved manner, because an Abyssinian ruler, to be worth his or her salt, must fight his way to the throne, and Zauditu was appointed without the firing of a shot. It was not until some weeks later that fighting took place, and that was not so much to put her on the throne, or to keep her on the throne, as a war of Christians for their religion against the Mussulman. Further, that was not altogether an Abyssinian affair; it was partly an off-shoot of the European war. It is true that Lij Yasu fought to regain the throne, or rather he remained in a convenient place for running away, while his father did the fighting and was captured, but I was credibly informed that he had at this time a letter from the Kaiser in his pocket stating what he would do for him if he proclaimed for Germany. As all the frontiers were occupied by Mussulmans, I do not know how many troops we should not

have had to divert from the fronts to keep Somaliland, the Sudan, and possibly Egypt had the Christians lost the battle.

There was also, when Zaditu came to the throne, a prejudice against a woman, and in the proclamation which she made at the time of her coronation she made graceful allusion to Queen Victoria as being, not only a short woman —and Zauditu herself was not tall—but a great woman like she hoped to be.

Having a woman on the throne, all the chiefs hoped to be able to use her for their own particular and personal benefit. They hoped to do the same with Ras Tafari. When they found he was going to take a part in the administration, they said to him, "Crown princes never do any work"; but he resented this allusion to "Little Willie" and stuck to his guns. The Christian–Mussulman war naturally produced chaos in the country. I believe there has also been some chaos in Europe since the war. The Empress was wise enough to see this, and made an unkind remark one day, when I told her the state of the country was chaotic, and the sooner it ceased to be so the better it would be for everybody concerned. She said, "Yes, it is quite true; God is punishing most of the nations of the world by giving them bad governments, and I do not think that He is punishing Abyssinia more than a good many others."

The author has told you a good deal as to the mentality of the Abyssinians. They are obstructionists by nature, and suspicious of themselves and every one else, and especially of foreigners. To give an example of this, at one time they had the idea of using the natural resources of their country to make their own cartridges and ammunition. There happened to be an Australian prospector in the country, and they thought they would send him to where copper had been reported, and get him to say whether it would be good enough for them to use at the Government cartridge factory at the capital. They gave him a passport to proceed to this place without hindrance. He got there and started digging, but they stopped him at once and said, "You are allowed to proceed here without hindrance, but you are not allowed to dig." A message was sent back to the capital, which was a month away, asking for permission for him to dig, and the authorities took about a month to think it over, but at last granted it. He commenced to dig and saw some promising specimens, which he put in his pocket to smelt in his tent. He was immediately arrested and taken for a several months' journey round the north, because it was said that he was allowed to dig but not to take anything away.

The Abyssinians cannot see beyond their noses, because they never travel beyond their noses. During the war I tried to get them to export cattle, and told them of the big fortune they could make by exporting some of their large stocks of cattle, but they said, "Every beast exported is a beast lost to the country." I told them it would encourage breeding, but they replied that they did not think that wanted to be encouraged.

As the author has said, they do not always get very good specimens of Europeans; nor do such Europeans set them good examples by their behaviour, or by what they have sent out to them. Thus I remember, at a time when the caravan routes were more than usually insecure, we tried to impress on them that such things were incompatible with modern civilization. We never thought of the "movies," but sure enough, shortly afterwards along came the first cinematograph —twenty-four blood-curdling films, "The Mysteries of New York."

I am not trying to excuse the Abyssinians; the state of affairs is horrible; but I am trying to explain in some degree how the present situation has come about since Menelik's death. I believe that the Empress, Ras Tafari, and

some of the chiefs would do something if they were given a chance. Otherwise I do not know what the future will be. Perhaps they will have to await the fulfilment of the prophecy which was made about the Ark of the Covenant, which was believed to be sealed up in the sacred city of Axum. It was said that the original Menelik, the son of Solomon and the Queen of Sheba, went to Jerusalem to stop with his father. When he got tired of staying there Solomon would not let him go back, and he therefore made his escape. He was just being overtaken by Solomon's cavalry, when he caught up with a procession which was conveying the Ark of the Covenant to some place near Gaza. As the cavalry were overtaking him, suddenly the whole procession, himself, and the Ark of the Covenant, were swallowed by the earth and fell into an underground passage which led them under the Red Sea to the sacred city of Axum in the north of Abyssinia. The stone which guarded the exit turned back just before the Ark went through, and the Ark is, therefore, still walled up in the passage, and the man who can unroll that stone *from the inside* will be the finest ruler that Abyssinia has ever had. The Empress and Ras Tafari are up against a wall of ignorant prejudice, joined to an arrogant feeling that Abyssinia's civilization is older and better than most others, and—a Moslem sentiment in a Christian breast—why tire yourself out striving to kick goals, when you never even said you wanted to play?

The PRESIDENT: Mr. Rey has given us a most fascinating account of Abyssinia, and the reason why it has been so good is that he has evidently acquired a real love for the country. He is so taken with it that he is going back again this year, and he would like to go back as often as he could. For that reason he has been able to enter into the real spirit of the country and form an understanding of the character of its inhabitants, and as a result we have had the extraordinarily interesting and valuable lecture to which we have listened.

Of course, in Abyssinia, as in so many other countries, one is up against the most difficult problem of how to preserve the respect and independence of the people, and at the same time secure their progress. I am certain that we British people would much rather secure the progress of other countries while preserving their independence than by using force against them. That is always an exceptionally difficult problem. I quite agree with the lecturer that the right way is by the country being given the assistance of Europeans. The further difficulty arises, however, that a country like Abyssinia, like the Royal Geographical Society, should only have the best, and unfortunately it is not very easy to get the best Englishmen, or the best Europeans of any kind, to go out to a country like Abyssinia into the service of a Government of the nature which the author has described, and devote the best part of their life to that. Service in a country like Abyssinia is probably very precarious, and there is always the very serious difficulty that if you have a good man out there and he gives advice, it is not taken. There the problem is, however. We have got to influence countries of this kind while respecting their independence as far as we possibly can. I think really what we shall have to do in future is to regard their progress not so much from the standpoint of material progress, but start at the other end and take them on the highest side, on the side of culture, and I think we shall get better results, and material progress will follow. I know that you would like me to propose a very hearty vote of thanks to the author for his exceedingly interesting lecture.

THROUGH WESTERN YUNNAN

F. Kingdon Ward

Map following page 240.

DURING the last twenty-five years the main east and west road across Yunnan from Bhamo to the capital has been traversed to and fro by so many Europeans, that the theme, as a traveller's tale, is well-nigh exhausted. But apart from this, and one or two northern roads, there are many corners of the province, especially bordering on Tonking and the Shan States, as well as in the north, which are yet scarcely known. A journey from Lashio, the terminus of the Northern Shan States Railway in British Burma, to Muli over the Szechwan border took me through some of the less-known parts of Yunnan, and it is of an unfamiliar route that I write.

I left Lashio on April 11, travelling north-eastwards to the Salween. Much of the country here consists of rolling grassland plateaux, only the streams being fringed with forest. Everywhere the rock is limestone, giving rise to a rust-red soil, and to typical scenery. One remarkable result is the formation of sinter terraces in the streams. In the upper reaches of the Nam Yao, for example, there are scores of these natural weirs, each terrace ending in a ledge over which the water pours; a deep pool forms below, and shoals gradually to the next terrace. Each ledge has a wavy outline, and hollow tongues project downstream. The ledges tend to work upstream as the lip is worn away, and more sinter is deposited in the shallows behind. As to the origin of the terraces, the heat of the sun would no doubt precipitate lime in solution; but they are especially formed under trees where the water is coldest. Hence it is not improbable that acids derived from decaying vegetation play a more important part in their formation. One stream, overshadowed by magnificent horse-chestnut trees then in full bloom, was a network of terraces, ledges, and crimped basins.

At the village of Möngyaw, three stages from Lashio, a disused stretch of cobbled road is seen. This is clearly of Chinese origin, and was probably in use at the time when the Chinese worked the silver-mines in the Shan States. It is interesting to observe that on their side of the frontier the Chinese are again actively engaged in making a good road in this direction. Just beyond this village the Nam Yao disappears underground amidst a wilderness of sinter boulders, which at this season are carpeted with the graceful little *Primula Forbesii*.

From Möngyaw we proceeded up a broad grassy valley, flanked by the towering Salween divide on our right; then crossing a low pass we descended into the basin of that river. The country is sparsely populated, with small Shan villages below, Maru villages above. This poverty is no doubt largely due to the limestone formation, which weathers to a

stiff clayey soil difficult to work. The underground drainage also is inimical to cultivation, and the hills, though well wooded, are steep and frequently broken by scarps.

The descent to the Salween from the crest of the divide is not less steep than it is on the Bhamo route, 100 miles further north. The Salween is here a mighty stream, flowing swiftly between high sandy banks covered with jungle. Several ferry boats ply to and fro during the open season. Mules are conveyed across in a big barge, while passengers and loads are paddled over on a raft, consisting of two canoes lashed together and decked in. A glutinous heat pervaded the valley, but daily rain-storms, accompanied by lightning and strong gusts of wind, swooped out of a clear sky and cooled the atmosphere.

After leaving Kunlong, a small village on the left bank, we marched up the valley of the Nam Ting. *Nam*, by the way, means "river." On the second day after leaving the ferry we crossed the Chinese frontier, and fording a stream from the north emerged on to a plain covered with high grass, evidently a swamp during the rains.

We had scarcely started next morning when we were overtaken by a Chinese merchant returning from Lashio to his home in Shunning. Invited to join his caravan, we gladly did so, as the road was said to be infested with brigands, and his party were well armed; indeed, every caravan went armed. Our friend led us by a direct road to Shunning, instead of crossing to the left bank of the river and following it up to Lünchow (Yunchow), as we should otherwise have done. At mid-day therefore we left the river and entered the mountains to the north.

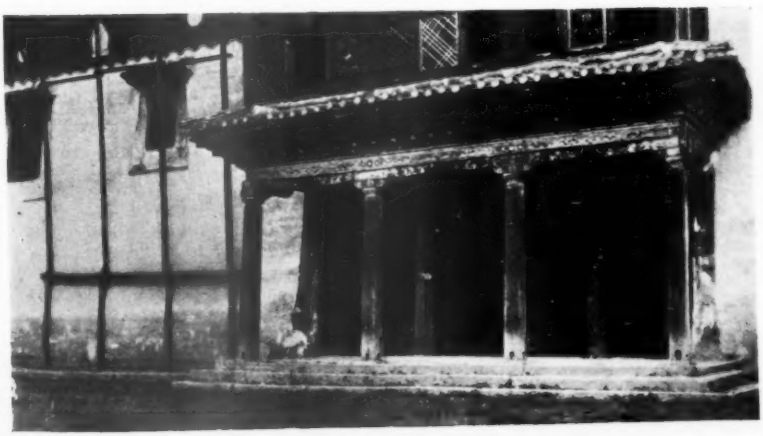
For the next two days we travelled parallel to the Nam Ting valley behind a range of limestone peaks, well wooded on our side, but steep and bare towards the south. When one reflects what a vast area of Yunnan is composed of limestone ranges, uplifted from 10,000 to 20,000 feet above sea-level, and further, that this rock must all have been laid down in a moderately deep sea, one begins to realize what tremendous forces have been at work in this country. Nor is that all. The limestone is frequently interstratified with belts of slate and schist, originally deposited in shallow water, indicating an alternation of upheaval and subsidence.

The country was still thinly populated, the villages poor; but the valley we were ascending was well cultivated, and astonishing quantities of opium poppy were hidden away in the remoter nooks.

Crossing a pass at about 6000 feet we turned more to the north, and descended into a fairly big valley dotted with villages. Here the vegetation underwent a marked change, monsoon forest giving place to a more Chinese type, in which pines and scrub oak predominated. Though not yet out of the Salween basin, clearly we were approaching the dividing line between the Indo-Malayan and Chinese floras, which corresponds roughly with the range separating the Mekong and Salween basins.

1. KUNLONG FERRY, NORTHERN SHAN STATES

2. RICE TERRACES IN SOUTHERN YUNNAN



3. THE MONASTERY, YUNGNING

4. ROCK TEMPLE IN SOUTHERN YUNNAN

5. CHAIN BRIDGE OVER THE MEKONG

Already the flora, though the Indo-Malayan influence was not yet entirely eliminated, was predominantly Chinese.

On April 25 we continued down this valley by a remarkably good road to the paddy plain below, where stood the wretched Shan village of Chenkang. There was a dilapidated temple here, occupied by ten equally dilapidated soldiers, ostensibly guarding the road; but as they smoked opium and gambled all night: as moreover, though armed with ten antique muskets no two of them alike, they had omitted to supply themselves with ammunition, I expect that their job was a sinecure. That brigands haunted the road was likely enough, but who shall say that these warriors, with whom we passed a restless night in the profaned temple, were not cause for greater alarm?

At some period a wave of religious fervour must have swept over Yunnan, washing even to the confines of the province, where the humblest village boasts its Buddhist temple. But the priesthood have long since sunk into disrepute, the people grown apathetic, the temples fallen to ruin. In the villages the latter are now schools, inns, or stables; only in the cities are they used for religious purposes. Yet the flame of religion still burns brightly in a few quiet spots, where it has somehow been protected. Here and there you may find a rock temple perched up on an almost inaccessible cliff, lovingly tended by some hermit priest who daily performs the rites of his office. Such picturesque fragments suggest that the triumph of Buddhism in China corresponded with the most artistic age, when the idea of beauty was embedded in the hearts of the people.

From this point to Shunning our road lay in a general easterly direction, crossing a succession of hill ranges, separated by valleys which grew deeper and narrower as we penetrated further into the interior. As for the road, it was the best I have ever seen in western China.

On April 27 we passed through a crowded country market, held at a little temple on the hillside. Here, every five days, the scattered Chinese and Shan families of the district assemble to buy and sell. In the evening we reached Yingpankai, the first Chinese village worthy of the name.

Yingpankai, as its name suggests, is modestly fortified, being partly protected by a wall and ditch. It boasts a number of tiled houses, a school (in the temple), and a yamen, but no magistrate. I rubbed my eyes next morning when I saw the broad road contoured round the mountain to turn a spur beyond. Could this be Yunnan? Most roads in western China take every mountain by frontal attack and no nonsense. Yet here was a fine mule road, though to be sure some of the gradients were steep.

Having reached the summit of the range we descended into a deep valley and crossed the river by a rustic bridge. The following day we began the ascent of the Mekong divide, and spent the night at a poor little village about halfway up. I slept in the new school-house, which

was complete in all respects save one—there was no schoolmaster ; consequently the attendance was negligible. On April 30 we reached the pass —about 8000 feet—and descended by a road, still remarkably good, to the valley where stands the city of Shunning-fu. Here we put up at a miserable hostelry, for though a district capital, Shunning is nevertheless a small and mean city, boasting no industry and but little trade in tea, which is grown on the neighbouring hills. One can walk round the city wall in half an hour.

On May 2 we proceeded on our way, marching up the well-cultivated valley and so into the mountains again. Amongst wooded hills the road now wound, with doll-like fields pecked out of the valley heads below. We had heard in Shunning that a new road was being engineered, and there was ample proof of it here ; for the new alignment crossed and recrossed the old road, which, as usual, was only a water-worn gutter. A mass of shrubs, many of them peculiar to Yunnan, clothed the crumbling granite slopes. The Indo-Malayan flora to the west had been finally shaken off, and it does not creep up the Mekong valley from the south even to this latitude.

Crossing the low pass we descended towards the Mekong, halting at the village of Sintsun, perched on the very brink of the gulf ; from here we could just glimpse the river, about 2000 feet below. The steep valley reflected the setting sun in flights of silver steps—paddy-fields.

The road down to the river is partly paved, and approaches the gorge on a long slant. For a mile before the bridge is reached it has been cut out of the solid rock, stepped, and protected by a parapet. The chain bridge also is in first-rate repair, and looks far more durable than the bridge on the Bhamo route. It bears the fanciful name "Bridge of the Green Dragon." The ascent on the left bank is not so good, being horribly steep and rough.

Two more ranges have to be crossed before the Yangpi river is reached. On the second night after crossing the Mekong we slept at Alushih, a considerable market village built on the hillside. From there we descended to the Yangpi, which is provided with a ferry only. The mules however swam across, the river being only about 50 yards broad at this season, and very tranquil just here. The Yangpi valley is arid and stony, relieved only by a few pallid shrubs drooping in the grim heat. Below the ferry the river burrows deep into the mountains, and disappears between high cliffs.

Ascending the next range we got back on to the limestone (round Alushih the rock is slate), and presently came upon a most picturesque temple. The road dipped sharply into a narrow ravine by a flight of steps passing under a high cliff. Embowered in trees, now foaming into flower, was the temple, crowning the cliff and difficult of access. The country continued sparsely populated, but well wooded. On May 7, however, came a change, when crossing another range we descended to

the narrow plain at the sources of the Red River and reached Mênghwa-t'ing, six marches distant from Shunning.

There is no bridge here, because there is no river. Lack of water is one of the troubles of Menghwa in the dry season; nevertheless the plain is well cultivated. We crossed a backwater by a mud bund and climbed a river terrace, and that was all we saw of the Red River. Passing through fields golden with wheat and carefully tended market gardens, we reached the city wall and found an inn in the large suburb outside the north gate.

Menghwa looks more prosperous than most *t'ing* cities, and the wall is in good repair; but I had no time to go inside. A guardian pagoda stands on a cliff above the gorge to the south, where the mountains close in and the streams unite to form a river; its influence is doubtless responsible for the prosperity of the city. It was a market day, and the streets were crowded with Lolos from the surrounding hills.

On the following day we turned due north, and by evening had reached the foot of the mountains at the upper end of the valley. On May 9 we climbed the divide separating the basins of the Red River and the Mekong, and from the summit looked down on to the Tali lake (Erh Hai). This range is a favourite haunt of brigands, who flourish despite a watch near the pass and a constant stream of traffic between Menghwa and Siakwan, or perhaps because of these. Descending to the lake we reached Siakwan that afternoon, and Tali the same evening.

A few days later we took to the road again, marching to the head of the lake, where there is a cave in the limestone. On the 15th of the eighth month (*i.e.* about September) a fair called the Yü-t'ang-huei, or "fair of the fishes' hall," is held here, when the fish emerge from the cavern and are captured in basket nets. Only one kind of fish lives in the cave, and it is found in no other part of the lake, so I was told.

Travelling round the head of the lake, we crossed the low divide to the east and entered the basin of the Yangtze. The descent to the river, down a gradually broadening valley, takes two days. Villages are scattered at intervals, but there is not much population, the slopes above being little cultivated; they are clothed with a variety of shrubs, but there are no trees. Above the village of Hwangkiaping is a high cliff, with a Buddha set in a niche near the summit. "Men cannot reach it," said one of the villagers, pointing it out to me. "Then how did they put it there?" I asked. "It flew there!" said a muleteer, and every one laughed. The practical Chinese have few superstitions of this sort.

We reached the Yangtze on May 17, and continued a few miles down the right bank to the ferry opposite Kinkiangkai. After the brawling Mekong the Yangtze always looks immense, spacious, and noble, as of course it is. The ferry-boat is of the usual type, a big barge high in the bows and stern, like a junk. Kinkiangkai is the highest point on the

Yangtze at which boats are in use, a sort of sampan being employed for trips downstream.

We now entered a valley running almost due north. The lower part is stony and rather barren, but from the village of Heiniukwang as far as the lake it is entirely cultivated and fairly thickly populated. The largest villages are Chila, towards the lower end; Chingyukai, about halfway up; and Chikwang, at the foot of the lake.

A little way up this valley we came upon a picket guarding the road, so concluded that it is a route much used by caravans going to Szechwan, though we met none at this season, and few on our return in December. Although the narrow valley—which in places does not exceed half a mile in breadth—is intensely cultivated, with many little villages embowered in trees, the surrounding hills are bare of timber and utterly dried up. At mid-day on May 18 we reached the small lake called Heiwu Hai ("lake of the black mist") occupying the head of the valley.

This lake is about 10 miles long by half as many broad. It has no visible outlet southwards down the valley—indeed owes its existence to ponding, the valley having been blocked by rubble cones shot out from either flank. But the underlying rock is limestone, so that the water no doubt filters through, to reappear lower down the valley.

The western mountains rise steeply from the water, and only a few small fishing villages crouch in the deep bays on that side. On the east the shore slopes more gradually to the hills, and is terraced for rice cultivation. Here villages are more thickly clustered. Much of the foreshore has been recently reclaimed, and the crops are irrigated from the lake by means of wooden scoops attached to ropes, which are swung like a skipping-rope between two persons.

A sharply defined line at the base of the western mountains appears to be a raised beach, and this lake, like so many in Yunnan, is no doubt slowly disappearing; but I was not able to examine it. The lake teems with fish, which are caught in circular hand-nets cast from the shore, or by floating nets set further out.

From Heiwu Hai the road ascends steeply, and crossing the hills, here clothed with pine trees, drops down to Yungpeh-t'ing, six stages from Tali.

Yungpeh is a forlorn-looking city with ruined gateways and ragged walls; like most *t'ing* cities in western China, it is out of a job since the neighbouring hill tribes saw the advantage of intercourse with the dominant race. The plain is surrounded by mountains, those to the east rising some 1500 feet above the city. A stream from this range has cut a deep trench across the paddy land (invisible till one is on the brink), and flows through a conspicuous gap in the western ridge, below which is another plain. Beyond that are the high mountains which enclose the Yangtze.

The country lying immediately to the east of the great bend of the Yangtze is unsurveyed, and I had no certain knowledge of a road northwards from Yungpeh to Yungning. Nevertheless it was probable that

such existed, and so it proved. On May 22 therefore we continued our journey. From the pass which crosses the eastern range a splendid view of the Likiang snow peaks, 40 or 50 miles away to the north-west, is obtained. This snowy range rises very abruptly from the Yangtze, but soon sinks to lower altitudes again. It is the southernmost of the numerous widely scattered snow massifs of Chinese Tibet.

The whole region lying between the loop of the Yangtze and the Litang river is composod of limestone, with occasional bands of slate or other metamorphic rocks. The well-wooded ranges run north and south, and their slopes are sparsely populated with various mountain tribes, chiefly Lao-p'ang and Lisu. The Moso occupy the higher and narrower valleys, while the Chinese have settled to some extent on the few tiny plains met with.

Rocky bulkheads, tying range to range, divide the intervening corridors up into a series of compartments more or less isolated from one another. The streams, after flowing quietly parallel to the main ranges for a space, turn and rend their way through them to join the Yangtze to the west or the Litang river to the east. Thus it was northwards up and down these narrow corridors, from valley to valley, over a succession of bulkheads that our route lay. For the first three days the road threads its way through wooded hills, almost uninhabited except for lonely Lao-p'ang huts high above the valleys. These Lao-p'ang, or Lo-lo as the Chinese contemptuously call them, are said to be great robbers; but unless they rob each other it is difficult to see how they can make ends meet, since so few caravans pass this way. However, patches of cultivation on the steep slope indicate that they have other less precarious sources of livelihood.

After crossing the pass above Yungpeh we descended to a marshy valley, where were a few scattered huts; then ascending another valley, reached a pass and descended through a wooded ravine, camping for the night as soon as the valley began to open out. Just below us were a few huts.

On May 23 we continued down this valley, crossed a stream, and climbing the steep wooded hillside reached another pass at an altitude of 9891 feet. In the valley below us a beautiful orange-flowered Primula was coming into bloom. There were no signs of habitation here, except a small child with some goats; the Lao-p'ang huts are well concealed, and usually high up. The valley we now descended was one of the prettiest we had seen, full of trees and bushes, many of which were in flower. Following the stream down till it turned away to the west, we crossed a spur and presently came down into a wide grassy valley, where we camped again.

Descending through the woods on May 24, we reached the Sha Ho in an hour. It is at this season a shallow stream, 15 yards wide, which flows west to the Yangtze. Once upon a time there was a good bridge

here; the central pier and abutments are intact, but the stone slabs which spanned them are missing, and have been replaced by a few logs. Consequently animals have to ford the stream, which, though easy enough at this season, might present some difficulty during the wet summer months. From the Sha Ho we marched up a broad grassy valley similar to that in which we had camped the previous night. Presently the forest began again, and we reached another pass, from which a high and barren limestone range, running more or less north and south, was visible to the north-east.

From the pass we descended into a charming wooded valley, diversified by open grassy glades, falling water, and broken cliffs. In front of us lay another valley, the stream from which turned west, and up this valley we marched to a camping ground a few miles below the pass. A couple of hours' climb on May 25 brought us to the top of the valley, on the watershed between the Yangtze and Litang rivers, all the streams crossed after this flowing to the east. Close by rose the high range seen the previous day, and far away in the north the tip of a snow peak was visible.

So far our general direction had been N.N.E., but we now turned more to the west. A great change came over the country, for the valley below us, instead of being well wooded, was very barren. Descending this valley we reached a few huts called Meikanho, where the Szechwan road turns off. Up to this point we had been on a highway which, whatever its defects, had at one time been of some importance. Parts of it were stone paved. By the Sha Ho were the ruins of villages long since deserted. What curse has overshadowed this fair country, that men should have abandoned it?

From Meikanho, however, we followed a mere track, descending another dried-up valley to the Lapa Ho, which is a considerable stream. For a few miles we could follow with the eye the Szechwan road on the other side of the valley, and see the white houses of Shingyingpan through which it passes; but after reaching the Lapa Ho, which here flows in a gorge, we saw it no more. By the Szechwan road Taifang is reached the first day from Meikanho, Tiechang on the second day, and Wumuho on the third; beyond that I could get no information. Continuing down the right bank of the Lapa Ho on May 26, we passed several Moso villages, and presently crossed to the left bank by a good wooden bridge opposite the village of Wakai. The river here makes as though to turn off to the east, but after wriggling through the mountains it returns to its former northern course, flowing through the plain of Paichupa.

The Yungning road simply crosses a low spur and descends straight to the plain, near the head of which is the Chinese market village from which the plain derives its name. The Paichupa plain is about 6 miles long by 2 broad, and is the first serious cultivation met with north of Yungpeh. Near the lower end of the plain is the village of Paochukai,

where we found a market in progress. The narrow street was filled with a picturesque throng of Lisus, Moso, and Lolo.

Soon after leaving Paochukai the mountains closed in again, and we were forced out of the valley. The Lapa Ho, after making another S-bend, entered a gorge and presently turned off to the east, while we ascended the limestone range to the west. Again the scene changed. Here were rock-strewn slopes ill clad with ragged shrubs, dry gullies, angular scarps to which the grizzled vegetation clung, tortured by thirst. Ash-grey mountains, fretted into queer shapes, rose against the blue sky, but in the west were higher ranges, their summits furred with pine forest. Up and down rude flights of steps beneath the shadow of the cliff we climbed, till dusk brought us to a few miserable huts set in a natural amphitheatre, from which valleys opened in several directions. This poor place rejoiced in the alluring name of Kinshakow, "the gully of golden sand." Apparently once upon a time gold really had been obtained here. Much more recently iron was mined in the valleys, and large heaps of slag remain to prove it. But this industry too has dwindled, and now there are only two or three mines a few *li* down the valley. Nothing remains to the place save its resplendent name. On May 27, after crossing a pass we descended to another fair-sized plain called Kanpatze, where there are several Chinese villages of the poorer class; the largest is called Paêrhchao. Though the plain is well cultivated, producing rice, maize, wheat and opium, the people seem miserably poor.

Turning east again we crossed a low wooded range, and presently rejoined the valley below in order to continue our march northwards. There was a small river here, but it was not the Lapa Ho; that had already turned to the east, cutting a passage for itself through the ranges. This stream flowed south to join the Lapa Ho, and together they burrowed into the mountains to flow to the Litang river. Crossing this stream, which came from the west, we marched up a valley along either side of which small Moso villages were scattered; then, entering a gorge, camped at the foot of a high range which forms the southern boundary of the Yungning basin.

May 28 was a long day. Climbing the range in front of us we reached a pass 11,260 feet above sea-level, and from the summit obtained a fine view over the mountains of Chinese Tibet, the sharp white towers of the Muli range being very conspicuous. Descending the wooded slopes by an abominable path hacked out of the limestone we reached a shoulder from which the tips of a snowy range west of Yungning rose into view; right below was the Yungning lake, a vivid sapphire lying at the bottom of a pale blue bowl of mountains.

The road now improved, and we quickly descended through pine woods, bright with flowers, to the lake-side. The lake is of irregular shape, its longer axis lying east and west, parallel to the dip of the strata. It is cut almost in two by a spur from the high range to the north-west, off

the end of which is a small rock crowned by a white monastery, the peaceful home of the high lama of Yungning. Here and there along the south-west and north-west shores are deep land-locked bays; the western shore too, along which our road runs, is much indented, but affords a little interrupted cultivation between the mountain foot and the water, where several more villages are buried in the trees. The largest of these is called Laoshuheiko, which means simply "the village by the lake." At the eastern end is a large marshy plain, evidently a silted-up part of the lake, but on three sides bold mountains are rooted in blue water.

Crossing the rim of this basin at the west corner we descended to a small marshy plain, in reality a drying lake. The overflow from the big lake has cut a deep groove through the rock here, but the col is now 100 feet above the lake-level, and no visible water finds its way to the Yungning plain by this route.

There is a high limestone peak at this end of the lake, with a long scarp overlooking the Yungning plain. Caught up amongst a tangle of spurs lying at its foot are several small lakes and marshes, the latter now emerald-green, spangled with flowers. The Yungning plain itself, reached by a corridor winding through the hills, is clearly an ancient lake-bed, formerly fed from the upper lake. We reached the monastery on the far side of the village at dusk, having marched for ten hours; thus the journey from Yungpeh had taken seven days. However it is really eight stages for pack-mules, at any rate in winter, when the days are short. In November we took eight days over the return journey. Yungning is a straggling village, with a yamen, where the *tussu* lives, and a monastery; there are very few shops, the population being almost entirely Moso, who cultivate the plain.

From the high western range flows a river, formerly crossed by a good stone bridge, which is now destroyed; a stout wooden structure has taken its place. The monastery is quite small, and is chiefly notable for a curious blend of styles, the main architecture being Tibetan, while the roof and minor ornamentation are as distinctly Chinese. I spent several days at the monastery, and before I left the head lama, a fat jovial Moso, came over from the island to see me.

On June 2 we resumed our journey to Muli. After travelling to the head of the plain the road divides, one branch going to a village called Lichiangtze, while the other keeps due north, presently reaching a big stream from the Muli range; next day the roads reunite, as there is only one path over the divide. June 3 saw us following up this stream and beginning the great climb. Camp was pitched on a steep meadow slope, yellow with a species of Roscoea, growing like crocuses at home. After halting for a day to explore the cliffs, we continued the ascent on June 5, but, coming into a perfect garden of flowers just below the pass at an altitude of 15,000 feet, we halted for a couple of days. Finally on June 7

6. THE KANGKALI RANGE

Note: Nos. 6, 7, 9, 10 illustrate more particularly Mr. Ward's paper on "The Glaciation of Chinese Tibet" in the May 'Journal.'

7. LIMESTONE RANGES WEST OF MULI, THE WATERSHED BETWEEN THE SHOLO AND LITANG RIVERS

8. WOODEN BRIDGE OVER THE LAPAHO NEAR YUNGNING

9. BARREN LIMESTONE CLIFFS AND SCREES ABOVE MULI: 15,000—16,000 feet

10. FIR FOREST ON THE LIMESTONE RANGES ABOVE MULI

we reached the monastery of Muli, above the Litang river, or Li Chu, as it is called there, and I was given quarters in the house of the cobbler.

Amongst the three or four Europeans who have passed through Muli on their travels are Mr. Amundsen the missionary, General H. R. Davies, and Mr. R. F. Johnston; but I venture to think that not one of them received the welcome accorded me in 1921 at the hands of the grand lama. The story of my five months' residence at Muli however cannot be told here; I had reached my destination after crossing Yunnan.

THE WIRELESS RECEIVING EQUIPMENT OF THE HAMILTON RICE EXPEDITION, 1919-20

John W. Swanson (communicated by Dr. Rice)

THE radio equipment of the expedition of 1916–17, while a sensitive and high-class instrument, did not fully meet the requirements of a portable receiver for an exploring expedition in tropical South America. The apparatus consisted of many pieces requiring assembling each time it was used, was weighty, bulky, delicate, and necessitated large antennæ to procure results. In the Amazon valley, the home of "static," it soon became apparent that "static traps" in the form of antennæ were not to be desired. Furthermore, it was no easy matter to erect antennæ; the trees of any height are very wide in diameter, the wood very hard, and the bark thin and slippery, making the use of climbing irons difficult and dangerous. I learned that early in the expedition of 1916, and employed Indians at every opportunity to climb for me when climbing was at all feasible. They can climb a tree monkey fashion and be at the top while one perplexes himself over the problem. But even an Indian does not care to expose himself to the excruciating pain of the sting of the large ants and other insects that infest the trees, and it was very difficult at times to induce them to climb. Another bad feature of the set was that the only means of charging storage batteries was by the means of a hand generator, a very unsatisfactory device in a tropical country.

With the above obvious handicaps in the radio equipment of 1916 in mind, the writer immediately upon his return from that expedition busied himself with constructing an equipment that would eliminate these handicaps, namely, a set that was durable and in one compact unit and which required no antenna or earth for its operation. Much difficulty was met, because it was no simple problem to place all the required pieces compactly without getting reactions between the various circuits. But finally a satisfactory receiver, comprising regenerative circuits with detector and three stages of audio and radio frequency amplification, was obtained, with the valuable assistance of Mr. Paul F. Godley, radio receiver expert.

Attention is invited to the accompanying photographs, showing the set of the 1919–20 expedition in operation; it could be transported upon the head of an Indian. The instruments were supported on a hard rubber panel, which was enclosed in a moisture-proof box. The cover of the case acted as a desk when the set was in operation. Receptacles for the legs will be noted on each side of the receiver. A specially constructed collapsible loop was attached to the back of the receiver. The entire set, exclusive of the necessary battery, weighed only 40 lbs. It was therefore a simple matter to pick the apparatus up bodily and place the loop in the proper direction or plane of the station to be received.

A description of the apparatus follows:

Wave Length Range.—When connected to an antenna of small size, for example one which is 30 feet high and 150 feet in length, this receiver has a range of 1200 to 15,750 metres. While still connected to the antenna the loop may be used as a loading inductance, and the range of the receiver will thereby be increased to a 16,750-metre maximum and 2000-metre minimum.

Composition.—A primary circuit, a primary-secondary coupling device, a secondary circuit, and the amplifier circuit comprise the receiver.

The Primary Circuit.—This circuit includes (1) antenna circuit variable condenser, capacity ·0014 mfd.; (2) condenser series-shunt switch; (3) primary loading inductance; (4) primary coupling inductance; and (5) binding posts for the connection of antenna and earth, or loop antenna, all of which are mounted on and supported by the panel.

The series-shunt switch throws the antenna variable condenser either in series to the antenna inductance and antenna or in shunt to them. When an antenna is used this condenser may be placed either in series or in shunt. When the loop is employed, however, the condenser is always used in series, except perhaps where an attempt is being made to get reception below 2000 metres.

The three multi-contact switches give access respectively to the inductance of the primary coupling coil in unit steps and in multiple steps, and to the primary load coil in multiple turn steps, and these are so marked on the panel. Attention is called to the fact that, on account of convenience and greater efficiency of design, the primary coupling coil multiple switch reads counter clockwise.

The Secondary Circuit.—The secondary circuit consists of (1) secondary variable condenser (condenser capacity ·0007 mfd.); (2) secondary coupling coil; (3) secondary load coil; (4) binding post for the insertion of additional loading inductance, or loop antenna; all mounted on panel.

For greatest freedom from interference and for stronger signals, the loop is connected into circuit with the primary, unless conditions are such as to make connection direct into the secondary circuit desirable. Quicker manipulation is possible when the loop is connected directly

into the secondary, since then there is only one circuit that requires attention.

A ten-point switch gives access to varying values of secondary inductance.

Amplifier Circuits.—The tickler switch and bridging condenser have been classed as a part of the amplifier circuits. The tickler switch makes common to both secondary and detector plate circuit as portion of the secondary circuit inductance, thereby coupling the two circuits. The bridging condenser is in shunt to the audio frequency unit (telephones or amplifying transformer). Its variation gives finer adjustment of the effective coupling between secondary and detector plate circuits than is afforded by the tickler switch.

In the amplifier circuits we also have four three-element vacuum tubes. The high-potential end of the secondary circuit is connected to the grid of the first of these through a small fixed condenser (·0005 mfd.), the other terminal of this same circuit being carried to the negative end of the filament.

With the tickler switch set at zero this first tube acts as a rectifier and detector of electrical oscillations. Should the tickler switch be moved to the right on the contacts, the tickler circuit will thereby have been coupled to the secondary circuit by virtue of the inductance now common to both circuits and regenerative amplification of the signals will have commenced. This action may be still further increased by proper adjustment of the tickler switch and bridging condenser, and finally carried to the point where the two circuits fall into step (complete resonance) and the tube begins to act as a generator of electrical oscillations, the frequency of these oscillations depending upon the period of the secondary circuit as governed by the value of inductance and capacity in the circuit. In the oscillation or generating condition this tube acts as (1) a rectifier of electrical oscillations; (2) a detector of these same oscillations; (3) a regenerative amplifier at both radio and audio frequency; and (4) a generator of oscillations whose frequency may be so controlled as to provide beat reception of continuous wave signals.

In the plate circuit of this first tube, connections are as follows: plate, primary of amplifying transformer, or telephones, high voltage battery (usually 40 volts), and tickler switch, the latter connecting through secondary inductance to positive terminal of filament-lighting battery, or, if on zero contact, directly to the last mentioned. The secondary of the amplifying transformer feeds the grid of the second tube through a small fixed condenser (·0005 mfd.), the other of its terminals going to the negative terminal of the filament-lighting battery.

The second and third tubes feed the third and fourth tubes respectively in like manner by virtue of the voltage drop across a 2-megohm resistance placed common to the output and input circuits of the second and third and third and fourth tubes respectively—that is, transformer

coupling between first and second tubes gives way to resistance coupling between second and third and third and fourth tubes.

Experience has shown the utter impracticability of placing even two transformer coupled stages of amplification in compact unit form with a receiver. All possible precautions fail to prevent continuous singing on the part of the amplifiers under these conditions, due both to electrostatic and electromagnetic coupling between the amplifier transformers and the receiving or oscillations transformer. This coupling in the case of resistance coupled amplifiers is reduced to electrostatic form only, and then is of a comparatively small order, since it is due only to electrostatic fields existing around the small resistances themselves and their connecting wires. Both resistance units and wires may be conveniently so disposed as to leave little to fear from this direction.

In the case of the first amplifier it has been found, however, that advantage may be taken of the slightly greater amplification possible where a step-up transformer is used without complications.

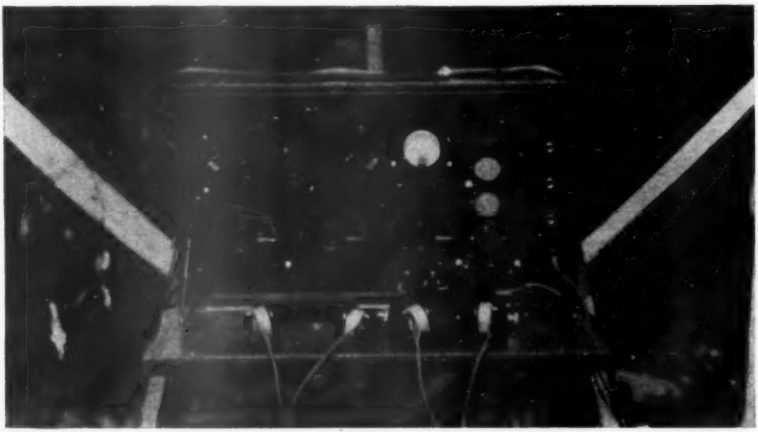
The grids of both the detector and the amplifier tubes are connected through a resistance of from 4 to 6 megohms each to the negative terminal of their respective filaments in order that excessive positive charges which may be thrown on the grid and cause stoppage of the tube action will leak off.

A floating panel, which carries sockets for the four vacuum tubes, is hung on a subpanel by the use of flat bronze springs and felt cushions. This method gives freedom from mechanical vibrations to which the tubes may be subjected, and which are so objectionable with several stages of amplification where weak signals are being dealt with. This mounting is not such, however, as to render the transporting of the outfit while tubes are in sockets advisable. They should be removed and placed in special felt-lined containers. Connections are made between tube sockets and capacity and resistance units by flexible conductor. These units are carried on the subpanel directly behind the tubes to which they relate, in order that leads may be as short as possible.

A separate rheostat is provided for control of filament current of each tube. Four jacks, one in the plate circuit (output circuit) of each tube, enable the operator to plug into the circuit at any point without necessarily changing any adjustment, and make possible the use of detector alone or any or all of the amplifier tubes. A filament current ammeter is placed in the filament circuit of the first tube. The maintenance of calibration of any oscillatory circuit used in conjunction with a vacuum-tube detector requires that the same type of tube be used at all times, and that this tube at all times draws the same filament current. A change of tubes or a change of 10 per cent. in filament current drawn may alter calibration as much as 5 per cent.

All tubes are fed from a common filament-lighting battery and a common high-voltage battery (60 volts), a tap being taken off the high-

THE FOLDING LOOP ANTENNA AND FIELD SET



PORTABLE WIRELESS RECEIVING SET

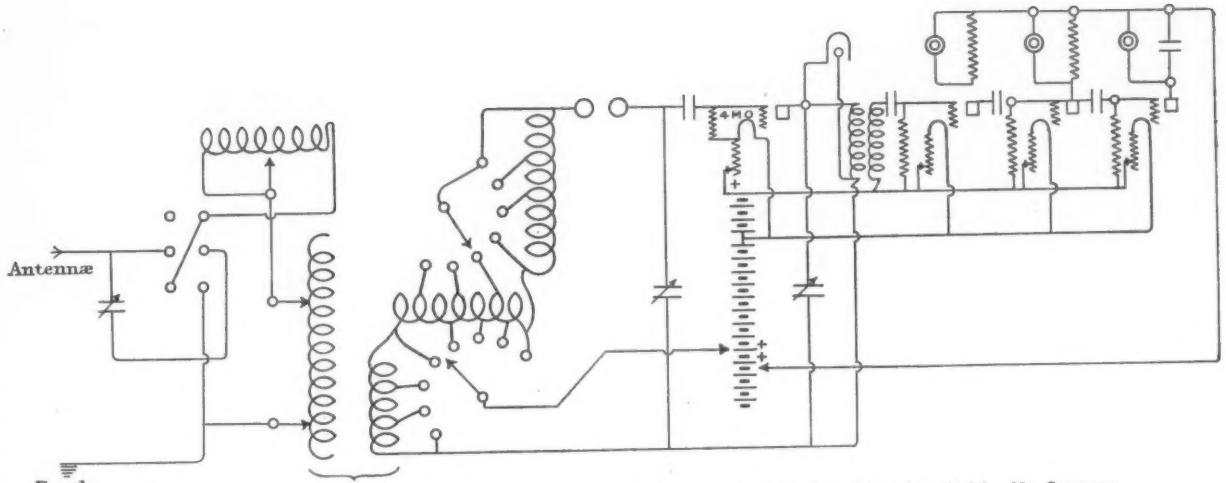


Diagram of the connections of the portable wireless receiving set (Hamilton and Rice Expedition) described by Mr. Swanson.

voltage battery (positive end) so as to give proper voltage for detector (usually 40 volts). In conection with a portable outfit the advantage of this arrangement is obvious.

Inductive Coupling Device.—It may be said without fear of successful contradiction that nine out of every ten receivers of the conventional design perform poorly when used in conjunction with vacuum tube detectors, due to failure to meet the requirements for proper control of coupling between primary and secondary circuits. In this receiver primary and secondary inductions have been so designed and disposed as to give an absolute zero coefficient of coupling when coupling control is set at about 35 degrees on the scale, at which time the secondary coupling coil is in a plane at right angles to the plane of the primary coupling coil. A movement of the pointer over the scale to the left increases the percentage coupling to a maximum which varies between 15 and 18 per cent. Movement of the pointer to the right gives between 3 and 3·6 per cent. Variations of these maxima depend upon values of primary or secondary inductance in use. Obviously, entire control is had under these conditions. The reverse coupling is provided to take care of any extraneous coupling which might arise from the use of loading inductances placed external to the receiver, or due to connecting wires improperly disposed.

In this connection it should be pointed out that when the loop is being used in the primary circuit and supported by attachments on the back of the receiver case, its field is in parallel plane of the secondary coil. Even under these conditions the reverse coupling afforded by the coupling device makes it possible to find a point of zero coupling between the two circuits, but the best results will be obtained only when the loop is properly connected into primary circuit. It is desirable to have the loop so connected that the field of the loop is not "bucking" the field of the secondary load coil.

A theoretical diagram of the connections of the receiver is attached hereto.

A 6-volt 40 ampere-hour storage battery of the chloride type was used, and was charged by current from the Delco outfit installed on the launch.

A small special battery of dry cells, totalling 60 volts, was secured from the Burgess Battery Co., of Madison, Wis. A number of these batteries were taken, and all rendered excellent service and had an exceptionally long life despite the humid tropical conditions, so detrimental to dry-cell life. The interest in developing special batteries for the use of the expedition is worthy of high commendation.

Brandes Standard Navy Phones were used, because these phones have no corroding parts and are extremely sensitive.

Various makes of audion tubes were used. A gas tube was found to be superior for detecting.

It is a pleasure to report that the results obtained with this receiver far exceeded expectations. Time signals were received at every locality where they were desired, and a daily newspaper, published from news received from radio-stations in the United States, Panama, and Europe, kept the members of the expedition fully informed of current events.

Owing to the better static ratio, the loop was used throughout the trip. With the proper balancing of circuits the static was practically weeded out, and gave little or no trouble. The signals received were at all times clear and loud regardless of time, place, and conditions. The reliability with which this instrument worked is marvellous; the receiver took precisely four minutes to place in operation, and no matter where it was erected good signals were received. Many times the receiver was erected indoors behind walls 2 and 3 feet thick, other times the very loop itself was buried in the massive foliage of the primæval forest, the grass enfolding the receiver; then again it was erected behind a sand embankment, which was directly in the plane of the station from which signals were to be received; and at Esmeraldo, Venz., excellent results were achieved practically at the base of the Duida Mountain, which has an estimated height of 10,000 feet, and which is directly in the plane of the stations from which signals were received.

Time signals transmitted in the usual manner were received practically daily from:

Location.	*Call.*	*Wave-length.*	*System.*	*75th Meridian,*
Annapolis, Md.	NSS	16,900	C.W.	11.55 to 12 noon.
Arlington (Washington, D.C.)	NAA	2,500	Spark	9.55 to 10 p.m.
Darien, Panama	NBA	7,000	C.W.	12.55 to 1 p.m. and 4.55 to 5 a.m.

THE PIBOR RIVER

Major D. Hay Thorburn [The Cameronians (Scottish Rifles)], Commanding Xth Sudanese, Egyptian Army

IN the plain that lies to the south-east of the Anglo-Egyptian Sudan, between the Bahr el Gebel branch of the White Nile and the Abyssinian mountains, the river Pibor is formed by the junction of the rivers Veveno-Lotilla and Kengen and flows northward for 140 miles until it meets the Baro; there the Pibor and Baro become the Sobat, and as such join the Nile below lake No at Taufikia. In 1920 I noticed that for some days the Pibor flowed southwards instead of northwards, and in 1921 I made up my mind to watch the movements of the river as closely as I could; hence these notes.

The Pibor throughout its whole course is a river of the plain, and, as is usual with such rivers, winds considerably. Not a rock or a stone is to be found in its bed or near its banks. The country through which it flows

is a grass-covered plain stretching to the eastern and western horizon, with nothing to break its monotony except the narrow belt of trees that borders the river, or an occasional heglik tree, the resting-place of marabout storks, standing alone in the plain. The fringe of trees by the river varies in breadth from a few yards to half a mile, but rarely exceeds 200 yards, and in some places, in the lower (northern) reaches, it is non-existent.

The plain itself consists of black cotton soil—in the wet season, thick sticky mud; in the dry season, hard and rough, with cracks from 2 to 6 inches wide and from 1 to 3 feet deep. Woe betide the unlucky pack-donkey that gets his legs into one of these cracks; he has to be lifted out by a couple of men.

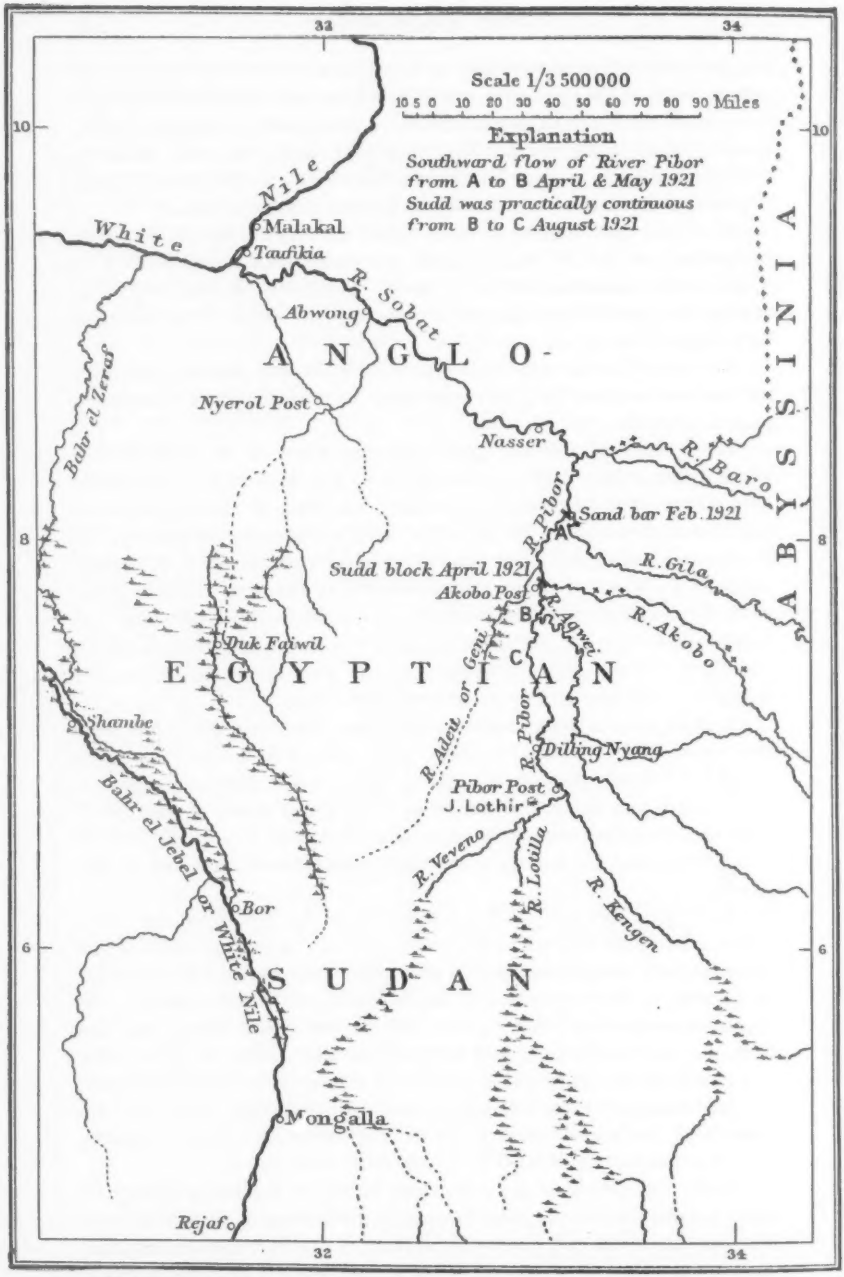
The rainy season lasts from May to October, and the dry season for the rest of the year, but it is not unusual for rain to fall in November, March, or April.

The greater part of the plain near the Pibor or its tributaries is covered with coarse elephant grass, 10 to 15 feet high at the close of the rainy season, and as there are no roads, travelling is almost impossible until it is sufficiently dry to burn the grass in December or January. If this is done judiciously when the wind is in the right direction, it is much easier to go about; but the surface is rough, as the roots of the elephant grass form knobs of unburnt stubble 6 to 9 inches high and from 1 to 3 feet apart. As the sun dries the ground between the roots it cracks, and these fissures gradually increase in size until at the end of the dry season in April they greatly hinder rapid movement.

Another kind of grass, much finer in texture and only 3 to 4 feet high, also grows, but it is usually found much further from the river; it is possible to march through this grass, but naturally quicker progress is made if it is also burnt. When burnt, fresh green shoots at once sprout from the roots, and even if no rain falls these grow to a height of from 6 to 9 inches and are eagerly nibbled by the hartebeeste, cob, and smaller gazelle.

The Pibor has well-defined banks; from the mouth of the Khor Agwei northwards they vary from 20 to 30 feet in height, but south of that point they are lower. In the dry season the river dwindles to a few feet deep, while in the rains it fills up and in places overflows its banks. The ground near the top of the bank is often a few inches higher than that further away from the river, and invariably is rather redder than the black cotton soil of the plain. This is possibly caused by the alluvial deposits of mud brought by its tributaries from the Abyssinian hills. On this better soil, rarely more than a few yards in width, the Nuers, Annuaks, and Beirs cultivate dura (millet), Indian corn, and tobacco.

Where the ground slopes away from the top of the banks of the river large lagoons form in the rains between these banks and the belt of trees. They are known as *tojh*, and in some years, if the river rises rapidly, they form open sheets of water, but if the rise is gradual the grass grows as



Sketch-map of the Pibor River to illustrate the paper by Major Hay Thorburn.

fast as the water rises, and while to all appearances it is grass-covered meadows there may be 20 feet of water. Where there is no *tojh* the tree belt is close to the channel of the Pibor, and in many places the trees overhang the water, especially south of the mouth of the Akobo river. The most common trees are heglik (*Balanites ægyptiaca*), which has a fruit about the thickness and twice the length of a hard green gooseberry, known as lalup and much liked by the elephants. Heglik is a hard white wood and has good calorific value. Kuk (*Acacia veruga*), habil (*Combretum sp.*), and dabkar (*Cratæva religiosa*) are soft white woods of little or no calorific value, but give welcome shade for a midday camp.

There are two kinds of tullah (*Acacia seyal*), the one with red and the other with a white bark. Natives say that the former is the male and the latter the female tree, but they are really distinct species, both of little calorific value.

The nabbak (*Zizyphus sp.*) has a long straight thorn about 2 inches long, and the kitta (*Acacia sp.*), with its hooked thorns, makes dense thickets. The ardeib (*Tamarindus Indica*) grows to a considerable girth and height and it is, without a rival, the most majestic tree that grows on the Pibor. A decoction made from its fruit is much used by natives as a cure for fever and as a cooling drink during Ramadan.

The "yoey" (I do not know its scientific name) is a red hard wood that always overhangs the water; it has the very best steam-producing qualities, and is very popular with native engineers and firemen of the river stern-wheelers on that account. Owing to the cutting of steamer fuel on the banks of the Nile the forests are gradually disappearing, and it is possible that the yoey trees on the Pibor may be drawn upon when the supply further north is exhausted. From Khor Agwei mouth to Pibor Post both banks of the river are thickly lined with yoey, and I have no doubt that an average of 2000 cubic metres of steamer fuel wood per mile could be obtained on each bank without ever having to go more than 50 yards from the river.

Game is plentiful on both banks of the Pibor. Waterbuck (*Cobus defassa typicus*) are as tame as cattle; Jackson's Hartebeeste are more timid, and to see a herd of over five hundred of these beautiful animals stampeding is a sight to be remembered.

The rare Mrs. Grey's cob (*Cobus maria*) is found near the spot where the Pibor meets the Baro, while the Beir country is full of white-eared cob (*Cobus leucotis*). Buffalo and elephant tracks are plentiful in Khor Lau, but I never saw any by daylight. Lions' roar may be heard most nights. A herd of sixteen giraffe, with a bored expression, stood on the bank and watched the steamer pass.

Of birds, crested crane, ibis, guinea-fowl, geese, and duck may be mentioned, while the brilliant kingfishers and such-like make the river a delight.

In the dry season, when the banks are uncovered, scores of crocodiles may be seen sunning themselves or slowly cruising along, showing their

eyes and nostrils only. They live chiefly on fish, but occasionally a native, and more often a goat or gazelle, is swept into the water by a stroke of a crocodile's tail, and then seized by their jaws and dragged to the bottom. When marching near the bank at a spot close to Gila mouth I heard snarling and growling, just as if a dog-fight was in progress. I approached the edge of the bank, and beneath were two crocodiles fighting. They were half in and half out of the water on a spit of sand, and one had the other by the throat; they were lashing their tails furiously in the water, and the foam was tinged with red. They paid no attention to me, but continued growling and fighting.

A few days after this—further south—I shot a waterbuck quite close to the water's edge. A few seconds later a medium-sized crocodile (about 15 feet long) scuttled out of the water and tried to seize the dead waterbuck. I shot and wounded the crocodile, who retired to the water. Half an hour later I saw a considerable commotion a few hundred yards up the river, and I found that several large fish had attacked the crocodile and were eating the flesh in the wound left exposed by the exit of the bullet. The crocodile, to escape the fish, had to leave the water, where he finished his career. These fish are from 2 to 3 feet long, as thick as a strong man's forearm, have a large head like a dog-fish, and are called in Arabic *Garmut*. They are easily caught on a ground-line baited with a lump of meat, and are eatable, though muddy in taste. Curiously enough a wounded crocodile almost invariably leaves the water to die, and turns over on his back to do so.

The native villages are generally built on low mounds called "dabbas"; at first sight these appear to be of sand, and one wonders how these islands appear in the black cotton soil of the plain. In my opinion these dabbas are the accumulated débris of old villages, in fact ancient rubbish heaps, and this was confirmed by excavation, as broken pottery and bones (sometimes human) were found. Owing to their origin these dabbas cannot be very healthy sites for villages, and the natives sometime desert a dabba, leaving it unoccupied for years, and then return to it again. The dabbas nearly all rise above flood-level, and are then habitable in the rains at the time when the plain is simply mud and water.

The northern reaches of the river are lined with Nuer villages and fishing camps. They are large cattle owners and great fishermen; they also grow a fair amount of dura and some tobacco. They fish from canoes, and use a spear with a detachable barbed head which is fastened to the base of the spear by a leather thong, which gives the spear the appearance of a bow. The fisherman kneels at the bow of the canoe and jabs the bottom of the river every few yards. If a fish is struck the spear-head detaches itself, and the spear reversed becomes a fishing-rod. Quite large fish are landed in this way. I have seen as many as sixty canoes, in the dry season when the river is low, paddling slowly up the river five or six abreast, driving the fish into the shallows and spearing them there, while

CATTLE SWIMMING PIBOR RIVER NEAR WEIKODNI
Voey trees on high bank left: single Kuk tree in centre

BEIR WOMEN, with bundle of white-eared cob skins on ground

Heglik trees and Kitta thorns: waterbuck in long grass

BEIR MEN

on the bank the women and children were busy gutting the fish and drying them over smoky fires.

The Nuers are very ugly, and add to their ugliness by plastering themselves with wood ash to protect themselves from the millions of mosquitoes which render life a burden after sunset.

The Annuaks, who live between the points where the Akobo river joins the river Pibor and where the Agwei flows in 20 miles south, are better looking than the Nuers, but are very lazy: they cultivate only the minimum of dura that will keep them alive, and own only a few cattle and goats. They fish in a different way from the Nuers: they spear the fish and pin it to the bottom, and then land it with their hands. They hunt waterbuck, etc., with dogs, and occasionally organize a drive on a large scale, in which a man or two generally get hurt by the horns of desperate buck trying to break through the diminishing cordon. They are on the whole a cowardly race, and if it had not been for the protection given them by the presence of Egyptian army troops, they would soon have been enslaved or annihilated by the more virile Nuers.

The Beirs, who live on the southern stretch of the Pibor and in the country to the south of Pibor Post, are rich in cattle and cultivate large areas of dura and Indian corn. They live in most primitive huts, and are too lazy to bury their own dead; they simply drag the corpse outside the village and leave it for the vultures and hyenas. When asked why they did not dig a hole, they reply, "If we dig we would be tired." The men are very well made and fine looking; they spend much time doing their hair, which is made up into a permanent sort of hat ornamented with beads and brass wire. They invariably carry a small stool on which they rest their neck when sleeping, so as not to disarrange their head-dress. They are great hunters, and in December and January organize drives of white-eared cob, which they slaughter indiscriminately, old and young.

The rains in this part are usually heavy, and in normal years two crops of dura are cultivated.

Pibor Post, a small Government fort, is near the southern end of the Pibor, a few miles north of the junction of the rivers. This fort was formerly known as Fort Bruce, and is so marked on some maps; it is still locally known to the natives, who are unable to pronounce the letter "B," as "Pruce."

Akobo Fort is on the Pibor river 5 miles south of where the Akobo flows into the Pibor. In February 1920 there appeared to be every probability that the Pibor would run dry before the rainy season began, and a dam was constructed to hold up sufficient water for the garrison at a point about 600 yards north of the fort. The dam was 20 yards long, and the depth of the water 2 feet. The water north of the dam continued to flow away, and finally there was, at the beginning of April, a difference in level of 18 inches. Soon, however, the water downstream of the dam began to rise until it became 9 inches higher than the water above, when

the dam broke, and the Pibor flowed the wrong way, *i.e.* from north to south, for some days. Heavy rains in May caused the flow to resume its normal direction, which lasted until the end of the year.

In December 1920 a large sudd block formed at the junction of the Akobo and Pibor rivers, and on 3 January 1921 the stern-wheel gunboat *Metemma* was unable, even with the assistance of 150 lusty soldiers with ropes, to force its way through the sudd against the current, which was flowing strongly north. The *Metemma* draws about 3 feet 6 inches of water, and will be remembered as one of the gunboats used by Lord Kitchener in the Nile campaign in 1898.

On 3 January 1921 the river gauge at Akobo Fort registered 1·7 metres. On January 23 the gauge showed only 62 centimetres, and on that date the *Eland*, a much smaller stern-wheeler, 50 feet long, 8 feet beam, and 2½ feet draft, was with difficulty pulled through the sudd with the current by 150 soldiers. The Pibor continued to fall rapidly, and soon ceased to flow at all south of Akobo mouth. As the river fell the floating sudd there gradually settled down, and the water that had been finding its way under, through, and over the sudd could do so no longer. This sudd completely blocked the river-bed for 400 yards, and acted as a dam which held up all the water to the south. The Akobo river continued to trickle into the Pibor north of this obstruction, and the Pibor north of this point continued to flow, at times almost imperceptibly, northwards.

Navigation by stern-wheelers ceased for several months, although the *Eland* on the return (*i.e.* southward) journey managed to come as far as the mouth of the Gila on February 5. She could not cross the sand bar that had formed there, and the mails had to be sent on overland. Attempts were made in March and April, *i.e.* the driest time of the dry season, to burn the sudd at the Akobo mouth, but with only partial success, as much earth and sand were mixed with the grass.

At the end of April the Baro and Gila rivers, both of which rise in the Abyssinian hills, were running strongly, and as the water in the Baro dammed back the Pibor, the water coming down the Gila began to flow south until on April 30 this water broke through the sudd block, and between that date and May 7 at Akobo Fort (5 miles south of the sudd block) the river rose 1 metre, and pieces of sudd floated southwards past the fort at the rate of 1 mile per hour.

About the middle of May this southward flow ceased, and during June, July, and August the Pibor remained practically stagnant at this point. Occasionally after a day of rain there was a slight northward movement, but this did not last long as a rule. The river continued to rise slowly, but this would appear to be due to local rains.

The south wind blew the floating sudd northward again, and this, augmented by more sudd from the Gila and Akobo rivers, blocked the Pibor from 600 yards south of Akobo mouth and for 400 yards at a bend 1 mile north of Khor Geni (or Adeit or Lau). Meanwhile the Gila

continued to discharge into the Pibor, and caused a moderate stream to flow northwards from Gila mouth to Sobat.

The waters of the Akobo river had been trickling into the Pibor north of the sudd block all through the dry season, and during the first half of May helped to swell the south-going flood of the Pibor; but from June onwards the waters of the Akobo caused the Pibor between Akobo mouth and Gila mouth to flow slowly, almost imperceptibly, northwards.

In August the water from Gila mouth to Sheikh Bartalan's village (Dilling Nyang on Map Africa 1 : 250,000, Sheet 78G) was brown in colour, exactly like a peat burn on a Scottish moor. Tea made from this water had a much better taste than tea made from Sobat water.

The gunboat *Metemma* left Akobo on August 7 (river gauge recording 3·69 metres at Akobo), and steaming only by daylight reached Pibor Post on August 13, and on the return journey reached Akobo on August 16 (river gauge reading 3·58 metres), after being 35½ hours under way. On arrival at Akobo many of those on board were suffering from violent irritation of the skin, accompanied in some cases with vomiting; possibly the stagnant water was the cause. Very little floating sudd was met, but for at least one-third of the distance the steamer had to plough her way through long growing grass and reeds which completely obscured the channel. This grass was frequently found growing in 10 feet of water, with 2 or 3 feet above water. Occasionally patches of clear water from 50 to 500 yards in length were met with in the sudd and grass.

Khor Agwei was blocked with sudd and showed no signs of flowing when visited on June 20, July 9, August 7 and 15, and on September 5 and 11. The sudd block at Akobo was blown northward by the wind about the second week in September, and both the sudd blocks were between the Gila mouth and Nasser on September 14. On September 9 the river Kengen was flowing muddy-white into the Lotilla, which was of brownish hue as before described.

Tradition says that General Gordon visited Gebel Lothir, a rocky hill near the banks of the Lotilla some 15 miles south of Pibor Post. I tried to get there, but I found it impracticable to reach the neighbourhood in the time at my disposal. Progress through the sudd was very slow, and frequent stops had to be made to clear the grass and the weeds from the stern wheel of the steamer. Often these were so tightly packed round the axles of the wheels that axes and choppers had to be used.

EXTRACT FROM RIVER RECORD AT AKOBO, 1921.

	Metres.		Metres.
April 30	Zero*	June 30	2·50
May 9	1·01	July 13	3·00
May 11	0·91	July 28	3·50
May 18	0·87	August 5	3·60
May 21	1·00	August 22	4·00
May 31	1·50	September 11	4·58
June 21	2·00		

* This does not mean that there was no water at Akobo Fort, where the water remained in pools 5 feet deep during the dry season.

THE MOUNT EVEREST EXPEDITION

THERE is at present very little to add to the summary of news from the expedition which we published last month. The early climbing season of 1922 was very brief. The expedition reached its base camp below the Rongbuk glacier (see plate) at the end of April, when winter still held in the valley: and in the first days of June the monsoon broke and the season was over—at any rate until September. In the few weeks available there were two highly successful climbs, and a third which ended badly in the avalanche. Within six weeks most of the best climbers were out of action by frostbite, and the whole party so exhausted by the prolonged exertion above 16,000 feet that there could be no thought of renewing the attack in the autumn.

The final conquest of the mountain must wait, then, for a third year's campaign, organized in the light of this year's experience and this year's great though not complete success. Closer acquaintance with the mountain has shown that the physical difficulties are more formidable, the physiological difficulties decidedly less, than had been supposed: the organization and equipment were on the right lines and in most respects perfect. But the weather introduces each year an incalculable factor, against which the best schemes may be laid in vain.

In October those members of the expedition who went out from England will reassemble on the platform of the Central Hall to recount their adventures and to receive the hearty congratulations they have earned so well. The meeting will regret that they cannot welcome and congratulate with them the four officers of the Indian Service whose duty will keep them in India.

By the last reports we are glad to learn that Major Morshead is doing well, and that he will lose no more than the tips of three fingers of the frost-bitten hand. The other members of the party who suffered less are already quite recovered: several are already home and others well on their way. General Bruce with headquarters arrived in Darjeeling on August 2, and the only member of the expedition left in Tibet is Captain Noel, who has established a photographic dark-room at Gyantse, and is hard at work developing many thousands of feet of cinematograph film and a great quantity of plates and panoram films. His leisure he spends in "filming" Tibetan life and customs; and he is not due in England until the middle of October. It will therefore not be possible to show any of the film at the Joint Meeting of the Society and the Alpine Club at the Central Hall on Monday, October 16, when General Bruce and several members of the party will give the first account of their work. A second joint meeting will be held on November 21 for the first show of the film, which will be awaited with great interest. Captain Noel did extraordinarily well in getting his cinematograph camera, fitted with an enormous telephoto lens, to 23,000 feet on the Chang La, and photographing the

Mallory Morshead Finch G. Bruce Longstaff Noel Bruce Wakefield Somervell Strutt Morris Norton Crawford

THE MOUNT EVEREST EXPEDITION, 1922

THE RONGBUK GLACIER BASE CAMP AT 16,500 FEET

CAPTAIN NOEL AND KINEMATOGRAPH CAMERA WITH LARGE TELEPHOTO LENS ESTABLISHED ON THE CHANG LA AT 23,000 FEET

climbing to about 26,000 feet. He writes that the Sinclair camera and the big lens by Taylor, Taylor & Hobson have been a great success. The latter was a heavy addition to the outfit, but it saved his life in the disaster which befell the third climbing party, for it proved too heavy for the climb in the new soft snow below the Chang La, and he had been compelled to turn back from the rear of the party only a few minntes before the train of porters was carried away by the avalanche.

Captain Noel in his letters mentions many difficulties in photography at extreme altitudes: the most curious is the effect of the dry Tibetan climate on the cinematograph film, which cracks and sparkles with electric sparks when pulled through the hand, so that it is necessary to work with a wet hand when threading the film on the developing frames. Happily this effect was anticipated, and the makers of the Newman-Sinclair camera succeeded in making the film run through the gate without friction, and provided open-mouthed film boxes, so that damage from electrical markings is reduced to a minimum.

The official photographs which have come home from the expedition up to the time of writing comprise about 200 quarter-plate negatives on glass, a certain number of large panoram films, and two small V.P.K. films. These are supplemented by good series of pictures taken by Dr. Longstaff and Captain Finch, which have been placed at the disposal of the Committee. A selection of enlargements is shown in the Photograph Room of the Society, but the record must be very incomplete until the arrival of Captain Noel in October with all the larger plates. Enlargements from these will be shown as soon as possible, and the Mount Everest Committee will probably arrange for a public exhibition of the pictures in the Alpine Club Hall after Christmas, as was done last January.

We hope to publish in the October number of the *Journal* a first selection of the photographs in photogravure.

THE ROCKS OF MOUNT EVEREST

Dr. A. M. Heron

DURING the attacks on the mountain by the climbers of the second Expedition, a small collection of rock-specimens was made at heights of from 23,000 to 27,000 feet, under difficulties hitherto unequalled in geological field-work. These specimens confirm the views I reached last year on inspecting the mountain by telescope from the Rongbuk valley from a distance of about 10 miles, and by examination of moraine material derived from its northern faces and spurs.

The specimens show Mount Everest to be a pile of altered sedimentary rocks—shales and limestones—converted into banded hornfels, finely foliated calc-silicate schists, and crystalline limestones. The hornfels and fine schists are in the field blackish or dark green rocks, conspicuously

slabby and with a general low dip to the north, which, I believe, adversely and even dangerously affected climbing. The crystalline limestones are fine-grained pure white rocks.

The specimens from 23,000 and 25,000 feet show in microscope sections a very fine-grained aggregate of quartz and a greenish mica, with irregular lenticles and veins of chlorite and epidote, and in addition sometimes calcite pyrites and sphene.

The mountain, from 21,000 to 27,000 feet, is made up of these black and dark green rocks, with occasional beds of white limestone, and veins of quartz and muscovite granite. From 27,000 to 27,500 feet extends an almost horizontal belt, a sill in fact, of schorl muscovite granite, along the whole length of the mountain, which rock presumably, by its superior hardness, gives rise to the prominent shoulder of the mountain north-east of the main peak (shown as 27,390 on Major Wheeler's photographic survey map). Above this again are black schists. Captain Finch informs me that he saw ammonites at a height of about 26,500 feet, but was unable to collect them.

As to the age of the rocks forming Mount Everest, they may perhaps be assumed, for the present, to be Jurassic or Trias.

REVIEWS

EUROPE

The Palace of Minos at Knossos.— Sir Arthur Evans. Vol. I. The Neolithic and Early and Middle Minoan Ages. Macmillan. 1921. Pp. xxiv. and 721. *Map and Illustrations.* £6 6*s. net.*

GEOGRAPHICAL students who for their special purposes consult this magnificent archæological record will find most of what they seek in the Introduction; and forward references in notes thereto will guide them to the author's grounds for his statements. The geographical result of Sir Arthur Evans' excavations and publication of them consists, naturally, in their demonstration of the part played by Crete before the seventeenth century B.C. in collecting influences of civilization from other lands and distributing her own influence and products afield in a very ancient world—these processes, of course, implying intercommunications by sea, and also some passage to and from continental interiors. The volume of traffic, whether in warfare or in peace, rendered probable by the evidence which he has amassed and expounded, is astonishing, considering the remote dates that are in question—dates long before the Phœnicians, and still more the Greeks, entered the commercial field. Indeed, Sir Arthur makes out a strong case for communication between Egypt and Crete even in the pre-Dynastic age of the former; and a less strong but arguable case for a migration of popular elements from Egypt to Crete, which might explain the suddenness and rapidity of the latter's rise out of the common Neolithic barbarism of the Levant. M. Raymond Weill's interpretation of the submarine remains at Alexandria investigated by a French engineer, M. Gaston Jondet, during the war, is, however, too incredible to serve Sir Arthur's argument.* Nothing could look less like the outline of a practicable harbour, whether

* See *Journal*, vol. 53, p. 201.

Minoan or any other, than M. Jondet's plan; and the remains in question, which have long been known to Alexandrian boatmen and port-officers, are explained far more reasonably as foundations of Ptolemaic quays and quay-side buildings, submerged by coastal subsidence.

Apart from this disputed point there is ample evidence to show that Egypt and the Ægean were in very early communication. Melian obsidian flakes found in the former region and Egyptian influences on fabric, form, and decoration patent in the Early Minoan products, prove Sir Arthur's contention up to the hilt; and the connection went on in an ever-increasing ratio through the later Minoan ages till, as our author says, one is often in doubt on which side of the sea a piece of fine work was made. Cretans must have lived among Egyptians, and Egyptians among Cretans, for many generations. With the Syrian and Anatolian coasts also Crete evidently had relations from early days, but less intimate and less fruitful, since she soon passed them in the race for civilization; and with Syria, at any rate, they were perhaps less direct, Cyprus lying in the way as middle-man and transmitter of Cretan influences. With Asia Minor the Minoans had more in common, as is to be expected from their geographical position at the end of a chain of islands connecting up with the Carian angle. Similarities of peculiar ritual and of personal and place-names are too many to be accidental, although craniology does not suggest that Crete and south-western Anatolia were settled by the same race. While the evidence for relations with the coasts from the Troad round to Cilicia is strong, there is very little to suggest any with interior Asia; and what there were probably passed through Cyprus—an island whose connections with the Euphratean lands are becoming more evident every day. The few remains of products of the farther East, *e.g.* shells from tropical waters, can be accounted for by Egyptian trade, or the direct contact with Libya which Cretan mariners then as now maintained from harbours on the south and east of the island, *e.g.* from Zakro.

On the west, Sir Arthur shows proof of the passage of products to and from Sicily, Italy and, more rarely, Spain; but the Mediterranean amber trade with the Baltic coast had evidently either not yet developed or not yet affected Crete.

D. G. H.

Die Eisen- und Manganerze Osteuropas.— Georg Behagel. Leipzig und Berlin: B. G. Teubner. 1922. Pp. 361. *Sketch-maps and Sections.*

This is volume 5 of the section dealing with mining and metallurgy in a series of publications issued by the Osteuropa-Institut of Breslau, which was founded in 1918 for the special study of east-European problems. One of the most important of these problems is that of the influence of the new orientation of political power upon the utilization of the mineral resources of Europe, especially those of eastern Europe and more particularly Russia, where there are important deposits of the ores of iron and manganese. As regards manganese ore, the position of eastern Europe is comparatively strong, for almost the whole of the manganese ores produced in Europe in normal times comes from the Caucasus area, the ores of which are of good quality.

So far as the known deposits of the ores of iron and manganese are concerned Russia is the only east-European country that requires serious consideration, a fact fully realized in Germany. With a large equipment for the smelting of iron ore Germany, since the cession of her Lorraine deposits to France, has not enough iron ore to smelt, and her problem is, where to obtain the needful supplies.

The apparent solution is that she should import ore from France. The Lorraine ore, however, is low grade and phosphoric, and Germany no doubt feels

that if she must import iron ore, she might as well import ore of good quality, especially considering the importance of fuel-economy. Consequently Germany turns for supplies to those European countries where high-grade ores are available, viz. Spain, Sweden, and Russia; but her competitors, England, Belgium, and France, require a large part of the Spanish and Swedish ore available for export. Moreover both Spain and Sweden have initiated metallurgical developments in the direction of a fuller utilization of their own iron-ore resources.

Germany is thus compelled to interest herself in Russia and other parts of eastern Europe, where there is a large and fairly open field for enterprise, and where there are certainly many possibilities as regards the discovery of other resources. For some time to come she will have to obtain her supplies from Austria and other countries commercially less remote than Russia; but it seems clear that she will turn her attention more and more to developments in Russia with a view to supplying her future needs of high-grade iron ore.

The facts as regards the iron ore and manganese ore of east Europe are set out carefully and in detail by Behagel in this book, which is divided into two parts. Part I. deals with the occurrence and mining of the ores in Russia, Caucasus, Poland, Balkans, and Asia Minor, while Part II. deals with reserves, production, and trade statistics, the economics of the iron industry in eastern Europe, and its significance for Europe in general and Germany in particular.

It would be easy, but also quite unfair, to cavil at many of Behagel's estimates of reserves. The making of such estimates is a very arbitrary matter, and authorities differ widely as to what should be included. He has, in the main, followed the Report of the International Geological Congress at Stockholm in forming his estimates, but he has used discrimination, and instead of the 37,700 million tons given in that report for the reserves of Great Britain, he gives a total of 5,500 million tons, on the ground that the British Carboniferous ironstones are for the most part not to be regarded as commercial ores.

Analyses of ores are given as well as descriptions of the deposits. The book is worthy of study as a useful compilation dealing with the iron and manganese resources of eastern Europe and the trend of German policy in connection with their development. T. C.

ASIA

The Foundations of Japan.— **J. W. Robertson Scott.** London: John Murray. 1922. Pp. xxvi. and 446. *Illustrations.* 24*s. net.*

The claims of this book as affording a "basis for a sounder knowledge of Japanese people" are abundantly justified. Before visiting the country the writer had obtained distinction as a student of the agricultural systems of Holland, Belgium, and Great Britain, and was able to bring to his task of investigating that of Japan the wide experience thus gained. The result is a volume of an almost unique character, for with the exception of a chapter or so in a recent work on Japan reviewed in these columns ('The Playground of the Far East,' Murray, 1918), it is the first one to deal with the paramount importance of agriculture as the chief source of Japan's national prosperity, and with the peasant class as forming the backbone of the national character. During his five years' stay in the country Mr. Robertson Scott travelled widely, from Hokkaido in the north to Kiushiu in the south, and his observations not only deal with the work of the farmer in the tillage of the soil, the rearing of the silkworm, and kindred activities, but very thoroughly and with patient sympathy regarding the conditions of labour and the peculiarly Japanese

methods of promoting the moral and social betterment of the labourers and the female operatives at work in the silk filatures of central Japan. He has much to record in praise of the "Young Men's Societies," with their pursuit of early rising, physical culture, and their efforts at mutual help and improvement; but the picture drawn of the lot of the factory girls in the majority of cases, with outrageous hours, insanitary conditions—day and night shifts frequently occupy the same beds—is very ugly to behold. To those who regard Japan as merely the land of the "geisha and the cherry blossom," it will be something of a shock to learn that of the 200,000 girls recruited yearly 120,000 never return home, either passing on to fresh places or sinking into positions of degradation or lives of shame; while of the 80,000 who get back 13,000 are sick, and of these 25 per cent. have tuberculosis. There *are* Factory Acts of sorts, but nearly all the really important provisions can be overridden on the plea of "special circumstances."

The all-importance of the rice crop, and the methods and details of modern sericulture are set forth with infinite care and clearness. Some of the most interesting and enlightening chapters are those which describe the author's experiences as a guest in the homes of many farmers and country landlords, from whom he was enabled to gain an inside knowledge of the problems of rural life to a degree hitherto unapproached by any European traveller before him. It is unfortunate, however, that no map of the country is provided to enable readers to follow the many journeys of the writer about the various provinces visited, for without one the names mentioned are practically meaningless. The climatic conditions so greatly vary in different parts of the country, and with them the conditions under which the work of the farmer is carried on, that some assistance to a clear understanding of the physical surroundings of agricultural activities is absolutely essential. It is moreover impossible properly to appreciate the character of the peasant classes (and these form over 60 per cent. of the total population) without a realization of the part played in moulding that character by the chief features of the land in which they and their forbears have been brought up. Nevertheless, this book is one of the greatest value as an aid to a clear understanding of the most interesting part of the Japanese people. W. W.

Treaties and Agreements with and concerning China, 1894-1919.— J. V. A. MacMurray. New York: Oxford University Press, American Branch. 1921. 2 vols. *Price* 50*s. net.*

The absolute equality of all sovereign states in the eyes of international law can be traced, if Sir Henry Maine is to be trusted, to the misreading of the old Roman law by Grotius. A principle intended to apply merely to citizens of various states was erroneously interpreted as applying to those states themselves in their international relations. With the decline of the Roman Empire and its supersession by small European nations the need was generally felt for some law, bearing within it the prestige of precedent, which they would be likely mutually to respect. The legal compositions of Grotius filled this gap. In accepting them the world thereby blundered into the conception of regarding all nations as of equal status, a conception which, despite its many drawbacks and obvious absurdity, has, with rare exceptions, persisted in diplomatic usage to this very day. The difficulties which its application presents are magnified rather than diminished when a country with only quasi-sovereign rights becomes involved. China is such a country, being free to legislate only within the barriers defined by her foreign treaties. In an age of kaleidoscopic change it is obvious that where these, in cases, date back half

a century they may have become a dam rather than a dyke for the river of progress which is so rapidly shifting its course. Yet for their removal or renovation the sanction of each of the sixteen Treaty Powers has to be obtained. It is in the power of the most paltry of these to thwart the wishes not only of China but of all the other Powers by adopting an obstructionist attitude. It bears resemblance to the ancient Assembly of Poland, so largely responsible for the vivisection of that unfortunate country, in which one hostile vote suspended reform. Brazil, with her microscopic interests, is legally empowered to defy by her isolated veto the aspirations of a united world; the British Empire may at times be compelled to use that nation's minister as its mouthpiece.

It is eloquent testimony to all this that Dr. MacMurray in his Treaties sees fit to include, as presumably providing legal precedent for subsequent transactions, engagements entered into between China and no less than forty-six other states. We find amongst the latter Uruguay, Peru, Nicaragua, Mexico, Siberia, Honduras, Hedjaz, Haiti, Guatemala, and other states of a like rank whose agreements are recorded. They form a kind of vast case-law against which there is no Supreme Court of Appeal either for foreigner or Chinese, nor is there legislative machinery that can be called into action to right obvious wrongs. Prior to the publication of MacMurray's two volumes the inquirer had either to search through dusty archives or remain in ignorance of a large portion of this scattered international code. He has now for the first time all its documents bound in a convenient form, and—what is equally helpful—fully indexed, the index alone occupying no less than 250 large pages of close type. The volumes are, of course, essentially intended for reference, and their accepted utility in this connection is shown by the fact that they are to be found on the shelves of every British Consulate in China.

One might have hoped that the compiler would have recorded his conclusions on the completion of his olympic task in an instructive introduction or preface, but we are given neither. All that is furnished is a section of two or three pages by an editor in America which reflect strange misconceptions. He informs us that the United States alone returned part of the Boxer Indemnity, and that "none of the Powers participating in the Chinese Indemnity, France, Great Britain . . . have seen fit to follow this example." In the case of Great Britain the reasons for her apparent greed are not far to seek. Her claim to indemnity merely made good actual losses incurred, it alone being severely scrutinized at the time it was presented. One would have expected that other impressions might have been left, after wading through this enormous mass of documents, than those of a purely hypothetical moral superiority of the United States in its dealings with China.

The main impression left on the reviewer is that of the hampering complexity of China's international engagements and the clumsiness of the machinery which can alone alter them. The signal success of the Washington Conference may perhaps be traced to the fact that four Powers only, instead of sixteen, controlled its decisions. If diplomats of the same Powers were given carte blanche to represent the outer world at Peking—if the dogma of equal status were definitely rejected—it is quite possible that a second Washington would be achieved. R. H. H.

Peking: a Social Survey. Sidney D. Gamble and John S. Burgess. New York: George H. Doran Company. 1921. $5 *gold.*

The scientific (as opposed to the philosophical) method, which by utilizing individual facts attempts to establish universal principles, is only too rarely

employed by writers on things Chinese. We are far too often treated to a list of generalizations which vary as widely in point of view as the natural bias of their authors. After reading Dr. Smith's 'Chinese Characteristics,' for instance, we are left with the impression that little that is too bad can be said of his subject, while if we turn to Prof. Giles' 'Civilization of China' we find it hard to realize that such a perfect race can really exist in the flesh.

'Peking: a Social Survey' acts as an admirable corrective to these two extreme views; it provides a mass of carefully arranged detail upon which one can found one's own opinions with conviction. Although the subject is strictly limited to China's capital, we know of no other work which enables the foreigner to obtain an equal insight into Chinese psychology and institutions. The chapter on commercial life is not only interesting but is worthy the attention of those concerned in the problem of harmonious co-operation between labour and capital in England. China has for centuries been faced with a similar question, her older guilds (or in modern terminology trade unions) dating back over two thousand years, but she has to a large extent profited by her longer experience.

"The Chinese have had so many centuries of experience," we are told, "that they know the exact strength of the different groups in the community and what would be the outcome of any struggle between them. As a result they very seldom resort to action; problems or disputes are talked out and demands compromised; . . . any trouble between employers and employees almost always arises because of dispute over wages; but these are rare, as the relationship between the two groups is so close that each is willing to recognize just claims of the other. . . . Then, too, both employers and employees recognize the fact that the public has certain interests in their work not to be disregarded. At present these are looked after by the Chamber of Commerce, which steps in and acts as mediator if an agreement is not reached within a short time."

The rules for apprentices in these guilds, who are normally bound over for three years, are written in a curiously earnest and ethical vein. "Young men should go first to a small shop, with small capital. You will have experience of hard work and learn that the making of money is not easy. If you go to a large shop after you have really learnt what trade is you will not do things in a wrong way. You apprentices should not sit down during the day except at the table, because the men in the shop are all your elders and teachers. You should hear but not speak," and so on.

On the other hand, a system of commerce in which regulation and co-operation tend to eliminate competition may perhaps be responsible for the widespread poverty in Peking. A chapter on this subject makes depressing reading. It is accompanied by a diagram which shows that in a large portion of the city no less than 37 per cent. of its inhabitants are written off by the police as "very poor." The latter expression judged by foreign standards is certainly no overstatement; it means, in fact, something far below the margin of existence for Europeans. Other chapters deal with the Social Evil, Health, Government, Education, Recreation, Prisons, and Religious Work in Peking.

R. H. H.

AFRICA

The Agricultural and Forest Products of British West Africa.— Gerald C. Dudgeon. Second Edition. Imperial Institute Handbooks. London: Murray. 1922. Pp. xii. + 176. *Maps and Illustrations.* 7*s.* 6*d.*

Conditions on the West Coast have changed a good deal in the ten years since the first appearance of this book. The war gave rise to a greatly

increased demand for the products of the oil-palm and the ground-nut; the world scarcity of raw cotton has led to the rapid growth of the cotton-growing ndustry of Nigeria; the Gold Coast has risen to become the chief cocoa-producing country in the world. Mr. Dudgeon, who has had wide experience n West Africa and Egypt and in the laboratories of the Imperial Institute, deals very fully with these and kindred subjects in the new edition of his valuable book.

The book deals in turn with the four divisions of (1) Gambia and Sierra Leone, (2) the Gold Coast, (3) Nigeria—Southern Provinces, and (4) Nigeria —Northern Provinces. The natural products of each, their distribution and local varieties, manner of cultivation and preparation for market, are carefully described. Many suggestions for the better use by the natives of the resources at their disposal are put forward. There are interesting examples of how tribal custom and native prejudice may stand in the way of progress. In the Gambia the natives refuse to employ their cattle for ploughing or cartage (p. 3), and the Moslem chiefs refused to send their sons to the Agricultural School of the Roman Catholic Fathers for fear of conversion (p. 4). The failure of Messrs. Lever Brothers to establish successfully a crushing plant in Sierra Leone is ascribed partly to the refusal of the natives to sell uncrushed kernels lest their wives, whose business it had always been to do the crushing, should become idle and therefore difficult to control (p. 25). Blame for failures, however, does not always rest with the native, and instances are given where the European merchants are the parties responsible.

Mr. Dudgeon's belief that the tsetse fly does not occur in Nigeria north of 11° N. lat. (pp. 122, 162) is unfortunately not borne out by the facts. The statement that Sonni Ali, the most famous of the Songhai kings, "was a native of the Eastern Soudan, and had come from Egypt" (p. 86), appears to be an echo of Felix Dubois' discredited theory of the Egyptian origin of the Songhai people. It is now generally agreed that Sonni Ali was a Berber, and of a tribe which had come out of the desert to the north. By an oversight the Baro–Kano railway is referred to as not being yet completed (p. 137). But, in a book so full of closely compressed detail, it is a wonder that errors are not more numerous.

The present edition does not contain much information more recent than 1919, and it is likely that a third edition will become necessary before very long. If so, a brief chapter on the natural regions of West Africa and the zonal distribution of the natural products would add greatly to the geographical interest of the book, and a more detailed treatment of forestry would increase its value. A general bibliography would also be welcome.

The book is well illustrated with photographs and is provided with a good index. It is to be regretted that the maps have not been specially prepared for the book, some of them bearing no relation to the text, and omitting most of the place-names given in the latter. The proposed route of the Eastern Railway of Nigeria is clearly marked, but of the nearly completed Thies–Kayes railway in French Senegal—which is bound to have a very marked effect on the trade of the Gambia—200 miles are shown on one map and only about 100 miles on another.

Professor Dunstan in the preface sounds a timely note of warning to those engaged in the West African palm-oil trade on the ground of competition from the Dutch East Indies and also British Malaya. E. W. B.

Through Angola: a Coming Colony.— Colonel J. C. B. Statham, C.M.G. London: William Blackwood & Sons. 1922. Pp. xv. and 328. *Illustrations, Maps, and Charts.* 28*s. net.*

Colonel Statham has given us a "mixed bag." His book is in part an account of a journey to secure specimens of the giant sable and of hunting with a camera, and in part an account of the physical features, geology, flora and fauna, and the peoples of Angola, with special reference to the possibilities it offers for white settlement and exploitation. Besides making good use of his own observations, the author has consulted practically all the authorities on the country, and the result is that his book is the best general treatise on Angola which we possess.

In both its aspects Colonel Statham's book is noteworthy and valuable. The personal narrative is full of good things and will be thoroughly enjoyed by the general reader. We learn much about the habits and distribution of the big game, and there is a considerable addition to our knowledge of the hitherto very inadequately mapped region between Malanje and the Kwanza—in which the giant sable was found. The colonel is of the rank-royal of hunter-naturalists and abhors the big-game butcher; during a five months' trip his bag was only eighteen. Naturally he deplores "the deadly trail of the Boer hunter," who kills simply as a trade, and he declares that unless the Portuguese Government intervenes the extermination of Angolan game is assured. At present there is no practical check on indiscriminate slaughter.

The historical summary is full of colour, and will serve as an introduction to a study of the subject; the account of the people shows that Colonel Statham has a real insight into the character of the Bantu; on fetishism and spirit worship he is sound and sensible, and avoids elaborate detail. He asserts more than once "the inherent laziness of the negro," but scarcely proves it; it might easily be shown that it is not greater than that of white and other races similarly circumstanced.

Colonel Statham but echoes the general opinion of all who have studied the subject that Angola is "a coming colony"; Americans have secured large oil concessions; Belgian-American interests are exploiting the Kasai diamond fields; British enterprise is carrying the Benguella railway to Katanga; a large part of the plateau of southern Angola—as the Germans very well knew—is suitable for white farmers, and could maintain vast herds of stock. Colonel Statham sets forth with care the prospects of the intending settler. He is kind in his references to the Portuguese. He writes of them as he found them in their reformed state in 1920, but he is well aware that it is owing to Portuguese methods that Angola is still only a "coming" colony.

Occasionally the author falls into error; he is perhaps too ready to accept official statements at their face value, and he is evidently imperfectly acquainted with the facts of the Leopoldian *régime* in the Congo and of recent labour conditions in Angola and the Cocoa Islands. Nor is it wise to lump together "as semi-civilized races," the Indian, Egyptian, Sierra Leonean, and West Indian. The first part of chapter ix., which deals with railway development, needs rewriting; it is confused in its references to the "backbone of the African railway system," and it is surely a far-fetched hypothesis to regard the Benguella railway (when completed to Katanga) as providing "another route to India and Egypt, should the Mediterranean be closed to Britain."

F. R. C.

AUSTRALIA AND PACIFIC REGIONS

In the Tracks of the Trades.— Lewis R. Freeman. London: William Heinemann. 1921. Pp. 380. *Illustrations from photographs.* 25*s. net.*

This is an account of a yachting cruise in the Pacific, undertaken in 1908; and it has some points in common with many other yachting narratives, which, however exhilarating to those engaged in the cruise, are usually trivial and lacking in serious interest. In this instance the yacht and her owner's party were American, and the book, though published in London, was "printed in the U.S.A."; therefore we will not quarrel with the writer's grammar and composition, nor with certain words he affects in a manner strange to English ears—such as "funicular" as applied to a volcanic cone, "mavericks," "sliver," and "ululating." What one is loth to excuse, however, is the author's habit of relating his impressions in forced pseudo-jocular language which, if it pleased his own fancy in the writing, serves in print only to irritate the sober-minded reader and exhaust his patience. An obvious feature in this is a lot of absurd exaggeration, inseparable perhaps from the style; but the book teems besides with downright errors, and no care has been taken to spell native words or names correctly, whether of persons or places, nor to differentiate between the Polynesian terms curent in the several groups of islands visited.

Fellows of our Society will be surprised to learn from Mr. Freeman (p. 151) that "The Society Islands took their name from the Royal Geographical Society, which sent an expedition there in 1868 to observe the transit of Venus"! This is only one example of sheer carelessness. But a more serious sin has been committed in publishing reproductions from non-original photographs as the author's own; and in the chapters on Fiji several of these, representing natives of the Solomon Islands and one of their canoes, are shown as "Fijians," and as "A Fijian head-hunting canoe"—though every one knows that head-hunting was never practised in Fiji (pp. 298, 299, 362). B. G. C.

GENERAL

A Short History of British Expansion.— James A. Williamson. London: Macmillan & Co. 1922. Pp. xxvi. and 648. *Maps.* 25*s. net.*

Dr. Williamson's 'Short History of British Expansion' is a substantial and comprehensive book. He begins with feudal England and mediæval trading corporations, and ends with Imperial Congresses and the Montagu-Chelmsford Report, and between these far-separated matters he marshals into a connected story all the diverse incidents and experiences, the growth and fluctuations of policy, the wars and the peaces which have gone to the making, the collapse, and the remaking of the British Empire. Such a book was much to be desired, for though much has in recent years been written about one or another period of British colonial history, no historian has attempted to combine the result of recent researches and give us the whole story in the light of our present knowledge and point of view. The student has every reason to be grateful to Dr. Williamson for taking in hand a task at once so difficult and so promising.

One of the great problems in writing the history of such a state as the British Empire is to know whether one should stand at the centre, as it were, or at successive points on the circumference. Dr. Williamson solves this by attempting each in turn. The subject, he tells us in his preface, "entails working sometimes from the centre, to obtain a proportioned view and to deal with ideas of policy, and sometimes in compartments to trace the history of various undertakings." We cannot comment in any detail on so extensive a

history, but we may say in general that Dr. Williamson seems to us more successful when he is working from the centre, and when he describes the earlier centuries of British expansion, the explorations, and the foundation of the Mercantile Empire—the old colonial system, than he is when he deals with the nineteenth century and the history of the present Dominions. On the earlier part he writes with fuller knowledge and has given himself far more scope; three-quarters of his volume is occupied with this, while to the wonderful story of the refoundation and growth of the British Empire since 1783 he has given only a quarter of his space, and this part of the book becomes little more than a concise summary of events in which the manifold and amazing interest and significance of the story is lost.

The book is illustrated by a number of instructive and original maps (though here again the history of the nineteenth century is strangely neglected), and after each section a bibliography of secondary works—useful, because brief and critical—has been added. E. A. B.

THE MONTHLY RECORD

EUROPE

The Ordnance Survey: Retirement of Sir Charles Close.

COLONEL SIR CHARLES CLOSE, K.B.E., F.R.S., who retired in August from the Ordnance Survey on reaching the age limit, will take with him on his retirement the good wishes of all British geographers. Since he was appointed Director-General in 1911 the Ordnance Survey has developed a scientific activity which not even the long interruption of the War and the stringent retrenchments of Peace were able to extinguish. Under his distinguished direction the stations of the principal triangulation have been in large part restored, and the true weight of the triangulation established by the operations round the new Lossiemouth base. A new precise levelling, with fundamental benchmarks referred to three self-recording tide-gauges, has been brought nearly to the point of publication. A new technical series of publications—the Professional Papers of the Ordnance Survey—has been established. An Archæology Officer and a Mathematical Adviser have been added to the staff of the Survey. And in the offices at Southampton is now installed the Central Bureau of the *Carte du Monde au Millionième.*

With all this scientific activity there has been great progress in the supply of maps for public needs, and great improvement in the methods of sale. The engraved quarter-inch (recently published as an Atlas with Index), the new Popular Edition of the one-inch, and the combined sheets of Holiday Districts in most attractive covers, are but examples of the general advance which has been made in all the series. The increase in cost of production due to the war has forbidden for the time being any further progress with a delicately beautiful one-inch map that has been seen in proof: a triumph of colour printing. The work of the Ordnance Survey during the War, when it was largely diverted from its normal functions and extended overseas, was of fundamental importance to the success of the British arms, but a most unwelcome interruption to the programme which Sir Charles Close had in mind when he was made Director-General. He is to be congratulated on his remarkable success in the most difficult circumstances.

Sir Charles Close is succeeded at Southampton by Colonel E. M. Jack,

C.M.G., D.S.O., Chief of the Geographical Section, General Staff; and Lieut.-Colonel H. S. L. Winterbotham comes from Southampton to succeed Colonel Jack at the War Office; the Society, which has within the last few years enrolled both officers among its Medallists, will wish them all success in their new duties.

ASIA

Herodotus and the Caspian.

Mr. S. Casson, of the British School at Athens, has discussed the interesting question of the knowledge possessed by Herodotus of the Caspian and bordering regions in the *Annual* of that School, No. 23. The conclusions arrived at are somewhat different from those of previous commentators, especially as regards the location of the tribes mentioned by the historian. The first part of the paper treats of possible physical changes since the time of Herodotus. Mr. Casson accepts the idea that at that time the Caspian and Lake Aral formed one great sea, and thinks that the dimensions given by the historian to the Caspian refer to the united sea, with a major axis running north-east and south-west. A point of some weight is no doubt the absence of all independent mention of the Aral in early times, and there may be objections to the view that the Oxus formerly flowed into the Caspian as we now know it. But the conclusions seem to be reached from but a partial study of the literature on the subject, and no account is taken of the important researches of Berg on the spot, or of the studies of writers like Barthold and Herrmann (cf. *Journal*, vol. 42, p. 396). Although Konshin, and, following him, Kropotkin, took a view much like Mr. Casson's, the idea that a progressive desiccation has taken place within historical times was wholly rejected by Berg. In any case the "marshy channel" supposed to supply the connection between the two basins would be far from making of them one great sea. For the early cartography Mr. Casson seems to rely wholly on the maps reproduced by Sven Hedin in his 'Southern Tibet.' He considers the "Lake of Kithay" to be "the earliest name of Aral," whereas in its origin at least it was associated with the *northern* route from Russia to China by the Ob, and has been plausibly identified by Mr. Baddeley ('Russia, Mongolia, China,' 1, p. lix. n.) with the Gulf of Pechili. As regards the account by Herodotus of the peoples not properly belonging to Scythia (not hitherto brought into relation with the Caspian at all) Mr. Casson's arguments are more novel and suggestive, if not entirely convincing. He thinks that a mistake has been made through not realizing that the lower course of the Don is from the north-east, and not from the north or north-west, as seems to have been thought by Herodotus. Consequently the data for the lands beyond the river must, he thinks, apply to a direction rather east or south-east than north, and he places the tribes spoken of (the Budini, Thyssagetae, Argippaei, etc.) in the districts bordering the Caspian on the north and east, the "broad deep lake with marshes and reeds on its banks," in the territory of the Thyssagetae, harbouring otters and beavers and "other square-faced animals" (seals), being identified with the North Caspian. No great difficulty is met with in fitting the further descriptions to the Trans-Caspian region, aud the theory has the advantage of bringing the whole of the data within a more reasonable compass of space than those which extend the information to much wider areas to the north. Its weak point is its dependence for each step on identifications which have gone before, so that if one of these is mistaken, the whole fabric is in risk of collapse.

AFRICA

The British Sphere in the Cameroons.

For those not conversant with the extensive German literature on the Cameroons, a collection of official reports issued by H.M. Stationery Office in May 1922 will provide a useful summary of the geography, native population, economic conditions, and administration methods in the British sphere established by mandate in the northern and western parts of the territory. The reports have been prepared under the orders of the Governor of Nigeria, to which the new provinces have been attached, and the general position is summed up in a Colonial Office note based on the Governor's despatch forwarding the reports. Just as Nigeria is divided into a northern and a southern group of provinces, each under the charge of a Lieut.-Governor, so the British Cameroons has been divided into a northern and a southern half, each added for administrative purposes to the Nigerian group to which it belongs geographically. The northern part has again been subdivided into two portions, one administered by the Resident of Bornu, the other by the Resident of Yola; while the southern, though attached to the Southern Provinces of Nigeria, is treated as a separate provincial entity. In the present reports the most space is devoted to the northern portion, which is treated in three sections. The first is the Emirate of Dikwa, originally part of Bornu, but occupied by Rabih during his period of power in these parts, and subsequently brought under German influence. The bulk is a flat and swampy plain between the mountains of Mandara and Lake Chad, but a southward extension on the western side includes a part of the mountains, inhabited by pagans, whereas the plains are occupied by Mohammedans. The northern portion is practically an extension of Lake Chad, with sandy ridges corresponding to the islands in the lake, while the black cotton soil (or "firki") between them, which yields excellent crops in the dry season, corresponds to the stretches of water. The state of civilization is that prevailing in the Mohammedan Sudan as a whole, and the administrative system is of a comparatively high order. The position of the Emirate is favourable, lying across the best trade route between Nigeria and the states to the east, but means of communication fall short of the needs, the passage of the "firki" flats presenting much difficulty. Corn is its main agricultural wealth.

The rest of the northern area is divided in two by the Benue, but the two portions, as described by the respective officers in charge, appear to have a good deal in common. Both are well watered and broken by ranges of hills, which are inhabited by pagans, while elsewhere the Fulani form a considerable part of the population. Both sections are generally fertile, and the hills in the north are remarkable for the perfection of their terraced farms. The southern section is more sparsely inhabited, and considerable areas are almost unknown. The mountain ranges are very striking, and the climate is comparatively cool and healthy. The grassy upland plateaux form magnificent cattle country. The Cameroons Province, which includes the Cameroons mountain, presents the greatest diversity of physical features, the main feature being the steep rise from the lower grounds to the Central African plateau corresponding in general with the division between forest and grass lands. The former are rich in oil palms and various hard woods occur. In the park lands of the Bamenda division the long-horned humped cattle of the north are reared by nomad Fulani. The natives of the British Cameroons have in general shown themselves well disposed to the new *régime*, but the primitive pagan tribes have not yet been brought into touch with civilization.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

The Colour of the Sea.

In a paper "On the Molecular Scattering of Light in Water and the Colour of the Sea" (*Roy. Soc. Proc.*, vol. **101**, pp. 64–80), Professor C. V. Raman of Calcutta gives the results of some novel experiments carried out by him which are of great interest not only to physicists, but to all students of the Earth in its picturesque aspects. Prof. Raman's elucidation relates only to clear blue water, uncontaminated by the sediment which is found near the shore. When observed from the deck of a ship the apparent colour of the sea is, of course, partly due to the light reflected by it from the sky. Prof. Raman is however concerned here mainly with the other part, the light which has gone down into the deep water and without reaching the bottom has somehow come up and out again. One may observe this light by looking perpendicularly upon the surface of the water. For, in common with transparent substances in general, water reflects least when light strikes it perpendicularly; a fact which one may easily confirm by means of a piece of glass and a candle flame. Thus during the *Challenger* Expedition the light rising from the water was examined by looking through the glass bottom of a floating tub. Prof. Raman has however devised a more convenient and more thorough means for eliminating the light reflected at the surface, by taking advantage of the fact that light which has been reflected from water at an angle of 53° to the line perpendicular to the surface is "polarized," that is to say its vibrations lie all in one plane containing the ray. Sieves through which such light will not pass are commonly constructed from certain crystals—tourmaline or calc-spar. By the use of such a sieve, called the "Nicol" prism, Prof. Raman was able to observe, in the deeper parts of the Mediterranean and Red Seas, the light coming out of the water unmixed with any light reflected at the surface, and he found it to be of a vivid blue colour. The origin assigned to this blue light is perhaps the most interesting thing in the paper. It is a familiar fact that when two different liquids, say water and lime juice, are stirred together, the mixture while yet imperfect usually appears slightly opalescent, that is to say it scatters the light. Now Einstein and Smoluchowski have shown that a single liquid can exhibit a similar opalescence, because the molecules of the liquid, in rushing hither and thither with the motion that gives us the feeling of temperature, form passing clusters and leave corresponding momentary emptinesses which, taken together, give the single liquid somewhat the character of a mixture. Smoluchowski has observed this opalescence near that critical temperature and pressure at which a liquid and its vapour become indistinguishable. For water this critical state occurs at 365° C. and 195 atmospheres. The novelty in Raman's treatment is that he applies the same theory to explain the scattering of light by water at ordinary temperatures and pressures.

The theory indicates that, volume for volume, water at 30° C. should scatter light 159 times as strongly as dust-free air under standard conditions. Raman compared in the laboratory the brightness of the blue light scattered by distilled water, which had been kept for a fortnight to allow the last traces of dirt to settle, with the light scattered by saturated ether vapour, which in turn had been compared with clear air by the late Lord Rayleigh. In this way the ratio which theory put at 159 was found experimentally to be 175. In so new a region of investigation this must be accounted as a pleasing agreement.

The paper also contains a discussion of the appearance of the sea, either calm or ruffled, when viewed in various directions and under various skies.

L. F. R.

HISTORY OF GEOGRAPHY

Large Maps of the Continents by Willem Jansz Blaeu.

Our knowledge of the early work of this great Dutch map-maker of the seventeenth century has received important additions within recent years, though still far from perfect. To his other productions as described by Tiele, Baudet, Stevenson, and others we have now to add an imposing series of maps of the four continents, which till quite recently had escaped general attention. Information which reached us showed that more than one set was still in existence,* and the Society has now secured such a set for its collection through Mr. H. N. Stevens. Unfortunately the maps have suffered severely from time, but those of Europe and America are complete and quite legible, while though portions of the other two are missing, enough remains to give a good notion of their character and contents. The present maps measure, including the illustrations in the margin after the style of the Blaeu and Hondius maps of 1605 and 1608, some 4 feet 6 inches × 3 feet 3 inches, and it was apparently a practice of the time to issue such large maps side by side with smaller examples of the more usual atlas size. From Edward Wright's complaint of Hondius' supposed infringement of his rights in regard to the Mercator Projection (see *Journal*, vol. 54, pp. 180–82), we know that even before 1599 Hondius had issued such a "Greater Mappe of the World and of Europe," besides smaller maps of the world and the four continents, and it is almost certain that he subsequently completed the series, which may have suggested to his rival Blaeu the issue of a similar set. When they were first published we have not been able to determine, but as the maps lately brought to light bear the name of Willem Jansz, the founder of the firm, as author, it must have been before 1638, the date of his death. In general character and contents, apart from the difference in size, they show (especially the America) a close resemblance to maps included by Hondius in the later editions of his Atlas, and dated 1631. But the productions of the two firms are so interwoven that it is impossible to say whether these maps of Hondius were copied from Blaeu's large maps, or were merely reductions of larger maps of his own copied by Blaeu. The present specimens appear to be later issues produced some time after the elder Blaeu's death, for on an inset of the South Polar region given (as in Hondius's atlas-map of 1631) in the lower corner of the America, an extremely rough indication of Van Diemen's Land (discovered by Tasman in 1642) has been added in a position originally covered by a part of the supposed southern continent. Also, while retaining the name "Boach Provincia" (more usually Beach) applied, as by Mercator and others, to the northernmost part of this continent in the Australian region, the words "detecta 1667" have been added. This would seem to be an error of the engraver, possibly for 1627, the date given on many maps of the period as that of Pieter Nuyts' voyage along the South Australian coast; for not only did no important voyage to this part of the world take place in 1667, but it is inconceivable that any map-maker who knew the results of Tasman's and other Dutch voyages to Australia in the first half of the seventeenth century

* One of these, we are informed by Dr. F. C. Wieder, is now in the possession of the K. Hollandsche Lloyd at Amsterdam, and is placed in its new building. From a photograph of the "America," kindly lent by Dr. Wieder, it is evident that this map at least is in excellent preservation, and that it is an early Dutch issue, while the Society's maps seem to have been re-engraved, perhaps in Italy, by one Pietro Todeschi. The letterpress surrounding the Dutch map bears the signature of Nic. Visscher of Amsterdam.

should ascribe the first discovery to the year named. On the map of Europe there is a long legend giving Blaeu's reasons for adopting the Peak of Tenerife as the starting-point of the longitude numeration in place of those used by other map-makers. This seems to mark the beginning of a practice afterwards pretty generally adopted in Holland. Enough has been said to show that the maps are well worthy of study as likely to throw further light on the history of map-making in one of its most important epochs.

GENERAL

Presentation to Sir Francis Younghusband of the Charles P. Daly Gold Medal.

This medal, founded by the will of Charles P. Daly, President of the American Geographical Society from 1864 to 1899, to be awarded from time to time by that Society for valuable or distinguished geographical work, has been given this year to our President, Sir Francis Younghusband, "for Explorations in northern India and Tibet, and for geographical publications on Asiatic and African borders of the Empire." The presentation took place on July 19 at the American Embassy in the presence of a distinguished company, including Earl Winterton, representing the Secretary of State for India, Rear-Admiral F. C. Learmonth, Hydrographer to the Admiralty, Colonel Sir Charles Close, Director of the Ordnance Survey, Sir Frederick Kenyon, Director of the British Museum, Colonel H. G. Lyons, Director of the Science Museum, Dr. Arthur W. Hill, Director of Kew Gardens, and others, besides various officers and members of Council of this Society. Earl Winterton moved, and Sir Maurice de Bunsen seconded, a vote of thanks to the Ambassador for his kindness in inviting the company to the ceremony. The medal had previously been awarded twelve times, the first to receive it being Robert E. Peary in 1902. European recipients have included Roald Amundsen, Albrecht Penck, Vidal de la Blache, and George G. Chisholm.

Prof. J. F. Unstead.

We learn with pleasure that Dr. J. F. Unstead, Head of the Geography Department, Birkbeck College, has been appointed Professor of Geography in the University of London, in respect of the post held by him at Birkbeck College.

Geography in London University.

This study is steadily rising in importance in the University of London. Provision is now made for a B.A. Honours degree in this department, for which the following four subjects are obligatory: (1) The Physical Basis of Geography; (2) The Use of Instruments; (3) Map Reading and Methods of Map-making; and (4) General Regional and Historical Geography. There are also five optional subjects, any two of which may be taken, these five being: (1) History of Geographical Discovery; (2) Historical Geography; (3) Economic Geography; (4) The Distribution of Man; and (5) The Distribution of Plants and Animals; and, in addition, four subsidiary subjects: Economics, Geology, Physics, and History, one of which must be taken. An Academic Diploma in Geography is also granted by the University to candidates who, besides fulfilling other requirements, have passed examinations in the obligatory subjects for the Honours degree. The scheme, it will be seen, is one which, while offering ample scope for candidates with diverse bents, gives even in its obligatory portion full recognition to the two main aspects of geographical study, the physical and the human. King's College and the

London School of Economics have made joint arrangements for full courses of teaching in all the subjects mentioned, but provision is also made for teaching that qualifies both for the diploma and the honours degree at University College, the Birkbeck College, and the Bedford College for Women, from which last college, it may be mentioned, came a large proportion of those who took this degree in October 1921.

Fourth Centenary of the First Circumnavigation of the Globe.

The celebration, in April 1921, of the death of Magellan in the Philippines, was virtually a celebration of the first circumnavigation of the globe, by far the greater part of the task—the first crossing of the vast Pacific Ocean—having been successfully accomplished solely through the initiative and hardihood of the great navigator who, by his tragic death before the finishing of the enterprise, failed to reap the ultimate reward of his achievement. But the actual first circuit of the globe was only completed on the return to Spain of the *Victoria* under the command of Juan Sebastian del Cano. This happy return of the survivors of the expedition is to be celebrated with much ceremony in Spain on September 5, 6, and 7, the sum of 250,000 pesetas having been voted by the Spanish Government for the purpose. The celebrations will take place at San Sebastian, and at Guetaria, a small fishing village some 30 kilometres to the west, which was the birthplace of Del Cano. This strip of the Spanish coast has further associations with the great voyage in that the *Victoria*, the only vessel of Magellan's fleet to complete the circuit of the globe, was built at Zarauz, which lies between Guetaria and San Sebastian. The King of Spain is to be present at the celebration. Institutions in other countries concerned with the progress of navigation and discovery have been invited to send representatives.

OBITUARY

H.S.H. The Prince of Monaco.

ALBERT I., Prince of Monaco, descendant of one of the most ancient families in Europe and holder by inheritance of a galaxy of titles in the peerages of France and Spain, was possessed of great wealth arising from the concessions which have made his state the centre of the gay life of Europe. He did his duty to his subjects by endowing them with educational institutions and hospitals, permitting them to live free of taxation, introducing them to a constitutional form of government, and safe-guarding them from every risk that wise administration can prevent. As a Prince he might claim to be a model ruler; but he did not glory in the greatness of his inheritance, which he viewed rather as a responsibility than a source of gratification. Unlike any other ruling Prince in history, he set before himself the ambition of winning a place in the world of science, not as a patron of men of science but as a worker himself.

In early life Prince Albert joined the Spanish Navy, and for a time during the war of 1870 he served as a volunteer in the French Navy; this breeding to the sea made a thorough sailor of him, and he was never happier than when afloat. The movements of the sea fascinated him, and his first important research was into the circulation of the surface water of the North Atlantic. In his schooner-yacht the *Hirondelle* he cruised in mid-Atlantic, and from 1885 to 1888 threw into the sea series of hollow floats containing papers asking the finder to report the date and place where they were picked up. By this means he prepared a most interesting chart of surface currents which was of consider-

able value in unravelling the relation of winds and currents. He also carried on deep-sea soundings and dredgings although his yacht had no steam power, and all operations even in the deepest water had to be carried on by winches turned by hand; yet he succeeded in dredging and trawling in depths of over 1200 fathoms.

After his succession to the throne of Monaco in 1889 the Prince enlarged the scope of his researches, and had a large auxiliary steam-yacht built in the Thames with special fittings for deep-sea work. She was named the *Princesse Alice*, and had a tonnage of 600 with engines of 350 horse-power. This vessel was exhibited to the members of the British Association at Edinburgh in 1892, when the Prince took part in the important discussions on meteorology which were a feature of that meeting. Seven years later he had a new steel yacht built in the Mersey and named *Princesse Alice II.*, of twice the capacity and three times the engine power of the former vessel, and with an extremely perfect equipment for oceanographical work; and in 1911 this was succeeded by the twin-screwed *Hirondelle II.*, built at a French yard on the Mediterranean, half as large again as the *Princesse Alice II.* in tonnage and of twice the engine power. This splendid ship developed a speed of 15 knots, and was by far the finest vessel ever equipped for purely scientific purposes. With each improvement in his equipment the Prince enlarged the personnel of his scientific establishment and widened the sphere of his researches. He kept himself in close touch with the oceanographers of all countries, and in Great Britain he consulted Sir John Murray on all occasions, and was frequently accompanied on his cruises by Mr. J. Y. Buchanan and Dr. W. S. Bruce.

His principal zoological assistant from 1888 on was Dr. Jules Richard. At first the Prince was always accompanied by an artist who took records of the fugitive colours of marine animals immediately they were brought on board; but later he employed colour photography with great success, and he was one of the first to apply the kinematograph to scientific purposes at sea. He also assisted meteorology by the use of free balloons for the investigation of the upper air, and it is recorded of him that the field of his researches in the Atlantic Ocean extended from 81° N. in the north of Spitsbergen to 12° N. south of the Cape Verde Islands, and from a depth of 6035 metres with the trawl to a height of 16,600 metres with the balloon. It is impossible to enumerate the improvements in apparatus and the development of methods effected on the many cruises of the Prince; but perhaps the most striking of his inventions was the deep-sea trap, a sort of glorified lobster-pot by which he enticed into his net many deep-sea fishes that had hitherto always succeeded in escaping the trawl. His discovery of the gigantic cuttle-fish on which the sperm-whale feeds was another very remarkable achievement.

The records of the scientific results of the expeditions were printed and published in Monaco in a magnificent series of superbly illustrated volumes.

Acting on the vote of the seventh International Geographical Congress held in Berlin in 1899, the Prince undertook the compilation of a complete bathymetrical chart of the oceans, in consultation with an International committee, but at his own personal expense. Two editions of this fine work have appeared in twenty-four sheets on a scale of 1/10 M, with layer colouring between contour lines representing depths of 200, 500, 1000, and multiples of 1000 metres.

The memory of Albert I., Prince of Monaco, will be perpetuated in the institutions which he founded and endowed. Foremost amongst these is the Oceanographical Museum at Monaco, opened in 1909, and fully described in the *Geographical Journal* for May of that year. In dedicating the building

the Prince said: "I open the Oceanographical Museum of Monaco in order to hand it over to the servants of scientific truth. In it they will find quiet, independence, and the emulation which fertilizes thought"; and many workers have since that day found that these words were true. Linked with the Museum at Monaco he founded the Oceanographical Institute at Paris, where, in a larger focus of scientific thought, more extended investigations and freer interchange of ideas can take place.

Nor was he munificent only to his life-long study of the sea. He created a Museum of Prehistoric Anthropology at Monaco with special regard to the exploration of the Grimaldi grottoes and the cave-dwellings on the Mediterranean coasts, and this he linked with the Institute of Human Palæontology which he founded in Paris.

In view of the greatness of his contributions to science the scientific honours received by the Prince were not excessive. Edinburgh and Aberdeen were almost the only universities to give him an honorary degree, the Royal Geographical Society gave him its Gold Medal, and he was an associate member of the Academy of Sciences in Paris, an honour which he valued more than all his ancient titles.

The Prince died on June 26, at the age of seventy-three, working to the last, although his cruises had been interrupted by the war, in which he was a personal sufferer through the wanton destruction of his beautiful country seat in France by the invading Germans. The Prince, who had been a pioneer in bicycling in his youth, was an enthusiastic motorist, and a great promoter of motor-boat racing at Monaco. As a man he was frank and genial, and he associated with scientific workers as one of themselves. A minute after introduction to him any foreign oceanographer altogether forgot that the kindly and enthusiastic sailor to whom he was speaking lived in a palace more splendid than that of most kings, and was fenced in on ceremonial occasions by a rigid Court etiquette.

HUGH ROBERT MILL.

Admiral John Moresby, R.N.

We regret to record the death of Admiral John Moresby, the first explorer of the south-eastern coast of New Guinea, at the great age of ninety-two.

Admiral Moresby joined the Navy in 1842, and was fortunate enough to see considerably more active service than generally fell to the lot of naval officers in Victorian times. He served in the Baltic during the Crimean War (silver medal), at Shanghai in 1862 during the Taiping rebellion, and commanded H.M.S. *Argus* in the bombardment of Shimonoseki in 1864. In 1865, at the early age of thirty-four, he was promoted to post-captain.

It is however by his geographical exploration in New Guinea that he will be best remembered. At the time (1872) when he first visited Torres Strait in H.M.S. *Basilisk*, the south-eastern coast of New Guinea, for a distance of several hundred miles northward from its southern extremity, was entirely unknown, and appeared upon the Admiralty charts as a dotted line. The only previous examination of this region had been made by D'Entrecasteaux, and was rendered extremely fragmentary and imperfect by reason of that explorer having kept at such a distance from the mainland as to preclude his ascertaining its outlines except at isolated points.

The *Basilisk*, an old paddle steamer of 400 h.p., depending at least as much upon sail as on her engines, was not a surveying vessel, and none of her officers or men had had any previous surveying experience. In view of this fact, the amount of original work which she accomplished is extraordinarily

creditable to the skill and zeal of all concerned, especially when it is remembered that the primary object laid down in Moresby's instructions was the suppression of kidnapping, and that his surveys had, at least during the earlier period of his commission, to be accomplished in the very narrow margin of time remaining to him after the principal object of his cruises had been effected. Moreover, in order to reach his self-assigned surveying ground, he was compelled to assume the considerable responsibility of quitting the limits of the Australian station, to which the *Basilisk* belonged, and entering the waters of the China station. Although justified by results, this proceeding might easily have involved him in serious trouble.

The *Basilisk's* surveys during 1872–1874 resulted in the delineation, in the south-eastern portion of New Guinea and its off-lying islands, of upwards of 1209 miles of previously unknown coastline and a large number of islands. Except in the Polar regions, it is doubtful whether there could have been found, at the time, another unsurveyed coast of equal extent.

To enable his surveys to be connected with those of D'Urville, Captain Moresby received from the Admiralty instructions to return home for paying-off *viâ* the north coast of New Guinea. On this voyage he had the assistance of a surveying officer, Lieut. L. S. Dawson, R.N., who had been specially sent out for that purpose.

An account of his New Guinea surveys was given by Captain Moresby in papers read before the Society in November 1873 and February 1875 (*Journal*, vol. 44, pp. 1 *et seq.*; 45, pp. 163 *et seq.*), and he subsequently published, in 1876, a work entitled 'Discoveries and Surveys in New Guinea.'

Captain Moresby's last service was as Senior Naval Officer at Bermuda, a post which he held from 1878 to 1881. He was promoted to Rear-Admiral in 1881, and retired in 1888 with the rank of Vice-Admiral, becoming Admiral on the retired list in 1893. His delightful work 'Two Admirals: a record of a hundred years,' which contains a short but very interesting account of his father Admiral of the Fleet Sir Fairfax Moresby, G.C.B., and his own autobiography, was published in 1909. During his latter years he had suffered the affliction of almost total deafness, aggravated towards the end by failing eyesight, but his mental faculties remained unimpaired. He never joined this Society, but his appreciation of its work was shown quite recently, when he presented to its collections the chart drawn by himself showing his discoveries in the south-east of New Guinea.

Admiral Moresby experienced the unique distinction of being the only naval officer to see his name bestowed, during his lifetime, upon one of H.M. ships—a destroyer built in 1916.

R. T. G.

CORRESPONDENCE

The Mokoto Lakes.

I WAS much interested in reading the short paper which appeared in the *Journal* for May on that fascinating African region the "Mokoto" District, by Mr. T. A. Barns.

The fact, ascertained by Mr. Barns, that the gorilla is found near to Walikali is of great zoological interest, and would seem to indicate that this animal probably exists, or formerly did so, right through from West Africa to the volcanoes of Kivu.

The information gathered by Mr. Barns that there are only three lakes in the Mokoto district would appear to be based on statements given him by

local natives. When Mr. Elphinstone and I were there in 1912–13 we only actually saw two lakes, but the information given us by natives was that there are four. No doubt this point will be cleared up later on. We camped close to the largest lake, the southernmost. In my diary I described it as several miles long, with several islands, one of which is inhabited; the shores where we approached it were fringed with papyrus and somewhat marshy. There were no hippo in the lake, and the local natives told us there were no fish, which we put down to its comparatively recent formation, or possibly to occasional volcanic activity. One thing is clear, that all these lakes, whether three or four, are connected with each other by small rivers, and it seems quite clear from Mr. Barns' investigations that they are in the Congo Basin, not the Nile.

I quite agree with Mr. Barns' view that the Mokoto lakes are of comparatively recent formation, as in fact is Lake Kivu itself.

As to whether there is a break in the rift wall through which lava, coming from the Namlagira volcano, might have flowed into the Mokoto depression, there is still doubt in my mind, though I see from my diary that we finally arrived at the conclusion that the old lava-field at Mokoto probably came from local sources. Taking the height of Lake Kivu as being 4950 feet above sea-level, the elevation at the point where we left the lava-fields in the *rift* valley was 5900 feet, and I see that we placed the mean height of the Mokoto lakes at 5800 feet. This is to say that they are at a lower level than the Namlagira lava-field in the rift valley. Our observations as to heights were made by aneroid. Taking Mr. Barns' heights it is also clear that the level of these lakes is lower than the Namlagira lava-field level, which at the point where we left it was some 1000 feet above the level of Lake Kivu. Mr. Barns states: "that there is a break here in the western wall of the rift valley is evident from the two steep bluffs in which the southern portion for a space of 6 or 7 miles terminates, but to what depth the break may reach it is impossible to determine beneath the piling mass of lava and scoria in which it now lies buried. No recent flow of lava reached the Mokoto lakes, although there are evidences of old lava near the eastern shore of Lake Lukulu, probably from one of the small craters in the vicinity which erupted large quantities of scoria during the convulsion of 1912–13."

There is a very extensive lava-field east of the lake which Mr. Barns calls "Ndalala," an extremely ancient flow, so old that it has become much disintegrated and is now covered by a dense forest in which there are many large old trees. The question is where did this lava come from? Was it from some local eruption or has it found its way there through some break in the rift-wall, which may now, as Mr. Barns suggests, be much filled up with scoria, etc.?

Mr. Elphinstone and I camped on the mountain-side immediately north of Lake "Ndalala," probably somewhere very near to Mr. Barns' camp. Our route there from Lake Kivu was not that followed by Mr. Barns; we took a roundabout course to the Namlagira lava-field, and crossed this to Namlagira's foot-slopes, whence we struck nearly north till we reached the edge of the western wall of the rift, where we ascended precipitously 1200 feet to the village of Mkule, at 7100 feet.

I do not understand how we missed seeing Lake "Magera," if its situation is that estimated by Mr. Barns, as our guide took us a terribly long march over the most fatiguing lava plain all the way to the slopes of Namlagira, on the grounds that there was no water to be found on the way.

I do not know what can be the small crater or craters in the vicinity of Lake Lukulu which Mr. Barns speaks of as having "erupted large quantities of scoria during the convulsion of 1912–13." We were on the spot in January 1913, when

this convulsion was taking place, but there was no eruption in the Mokoto district; nothing was active except the new volcano which Mr. Barns speaks of as being unnamed (but which the Belgian officials at Bobandana had christened "Katarusi") and Namlagira itself, which was smoking heavily and throwing out occasional mud showers. I feel sure that if there had been any eruption, however small, in the Mokoto district, we could not have failed to hear of it, or to see it, unless it occurred after our departure (January 1913).

The large inlet at the north-western corner of Lake Kivu, which was known to Europeans at the time of our visit as "Kabino," I see put down in Mr. Barns' map as "Mbuzi Bay," but the shape is incorrect.* Kabino forms almost a separate lake, some 12 miles long, and is connected with Kivu by a quite narrow opening a few hundred yards wide. I do not know that it matters what name it is given, but it would probably be advisable to stick to one or the other.

Mr. Barns does not mention the Belgium station of Ngoma on the north shore of Lake Kivu, but I presume that it is still in existence. It is disappointing that Kissenyies Station should be more or less abandoned. At the time of our visit, while in German hands, it was a beautiful place. It occupies the best situation hereabouts, and was going ahead as a trading centre.

ALFRED SHARPE.

London Geography.

In Mr. Bromehead's excellent article on London I note one slight slip which, as it may lead to misunderstanding, should be corrected at once. The Tyburn springs are stated (this vol., p. 133) to have been "near the present Marylebone Town Hall." This does not mean the new Town Hall in Marylebone Road, but the old Marylebone Court House, close to Oxford Street, a building known as the Town Hall only during the first twenty years of this century—a very brief episode in its history.

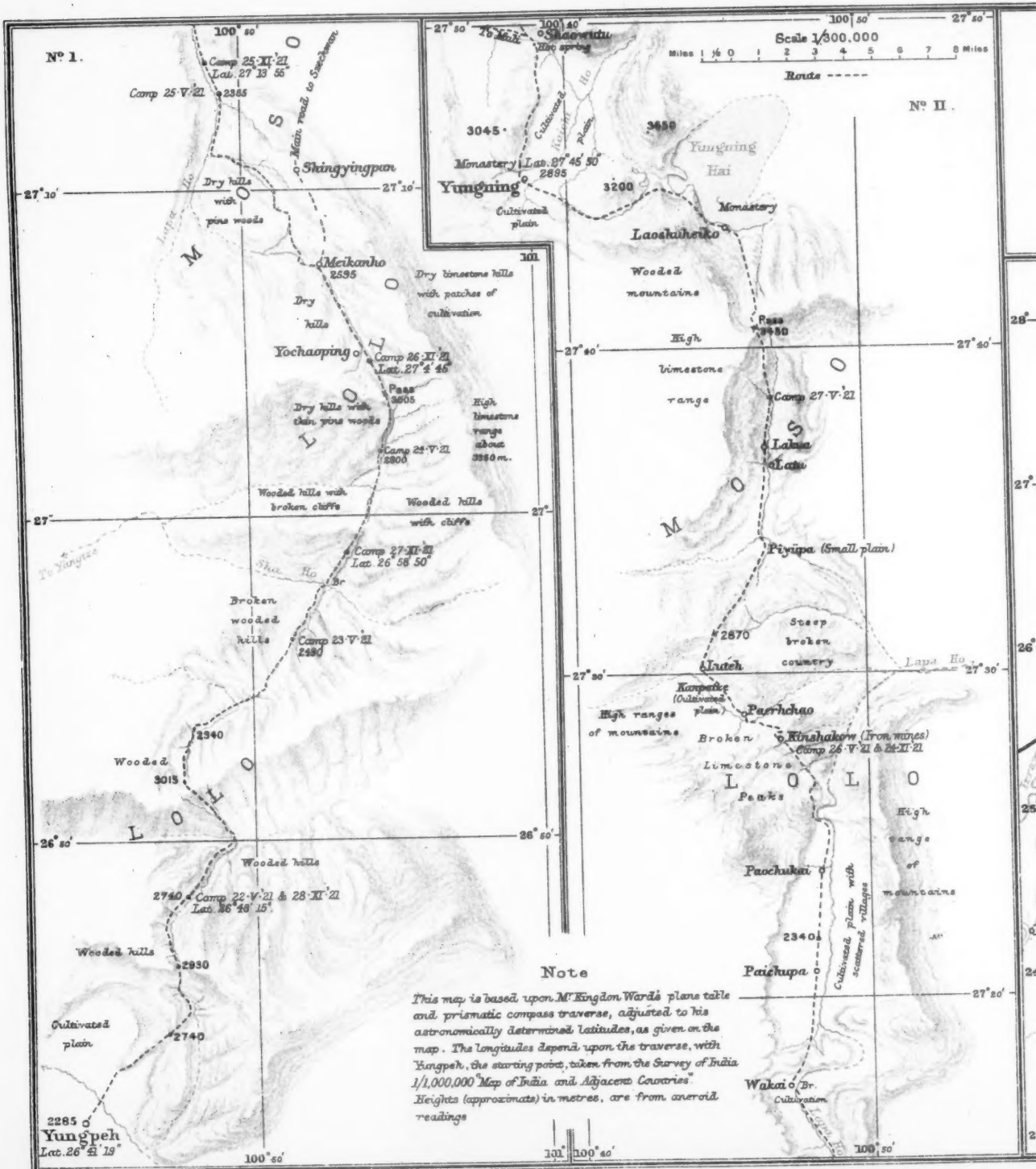
A. MORLEY DAVIES.

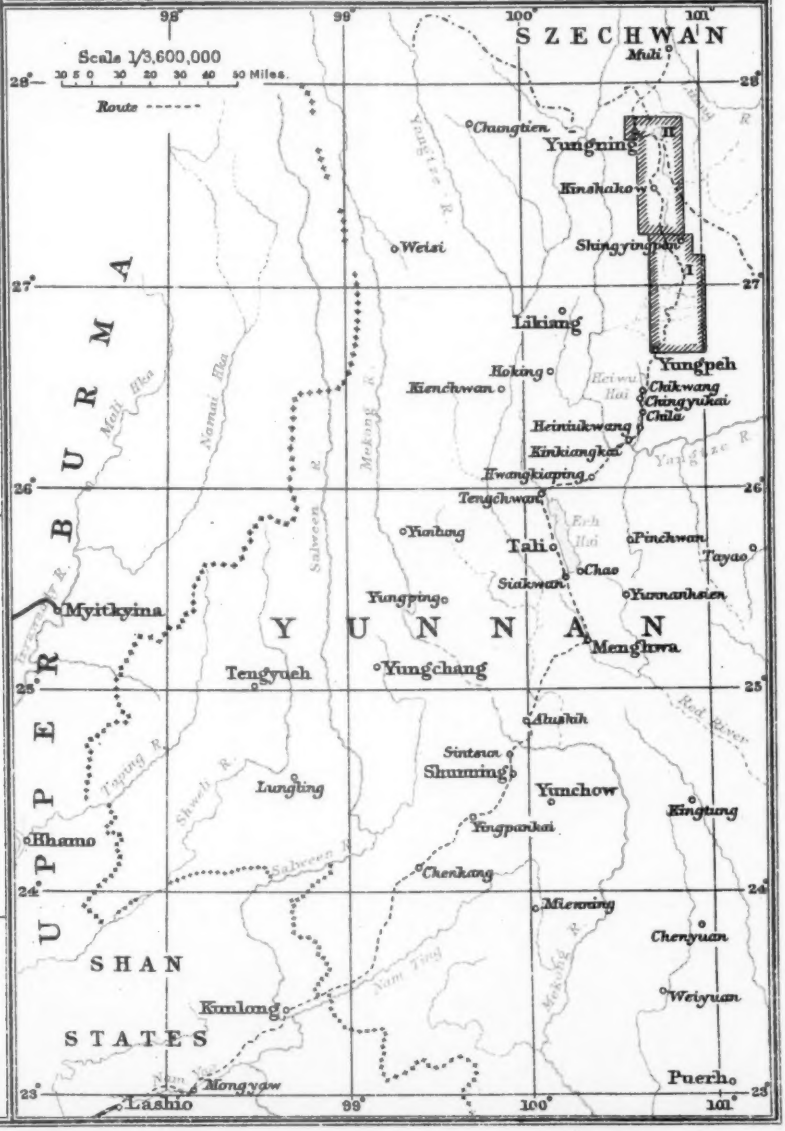
MEETINGS: ROYAL GEOGRAPHICAL SOCIETY: SESSION 1921–1922

Sixteenth Evening Meeting, 26 June 1922.—The President in the Chair.

ELECTIONS.—Mrs. Lorna Atkinson; Miss Kathleen Balmforth; C. A. Liston Blyth; C. Brudenell-Bruce; George Eustace Brunwin; A. C. Bushell; Gerald Byers; Allen Carpe; William Lofthouse Carter; G. J. Travis Clampett; Louis Williamson Conover; Arthur Cedric Davy; A. Gillespie Dickson; Ernest Dutchman; George A. Earle, B.SC.; Ernest Farquhar; Rev. R. Lee Featherstone; F. Fairchild Fergusson, A.M.I.C.E.; Christian F. J. Galloway, B.SC.; Miss E. Beatrice Gibbes; Rev. R. Hall Glover, M.D.; John Campbell Harwood; George Stanley Hepburn; Gerald Herbert; Charles S. Hill; John Webb Holmden; Mrs. Violet Mary Hume; Mrs. Celesta Hamer-Jackson; Arthur Curtiss James; Joseph Miller Kelly; Charles Wye-Kendall; H. F. Lancashire; Robert Lawther; Mrs. Laura Longden; Major C. Nicolson Manning, O.B.E.; Major H. C. Maydon; Lieut. David D. Mercer, R.N. (retd.); Donald R. Paterson; El Miralai F. G. Peake, Bey; P. Wilbraham Perryman; C. F. Rey; Edward C. Robinson; Lady Sanders; Charles H. Saxelby, M.SC.; Captain R. H. Tottenham-Smith; Walter T. Stevenson; William H. Sutton; Major-General J. T. Burnett-Stuart, C.B., C.M.G., D.S.O.; Harold Tinker, B.SC.; Cyril Horace Vizard; Lieut. J. Wilton Watts; A. E. Mortimer Woolf; Mrs. C. Plomer-Young.

* Only the north shore being shown, the peninsula to the south-east was omitted.—ED. *G.J.*



Published by the Royal Geographical Society

Route from
BURMA TO SZECHWAN
through
WESTERN YUNNAN
by
F. KINGDON WARD
1921